Vol. I JULY, 1919 No. 4

THE PAPER INDUSTRY

The Monthly Educational Journal of the Paper Industry.

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An Appreciation

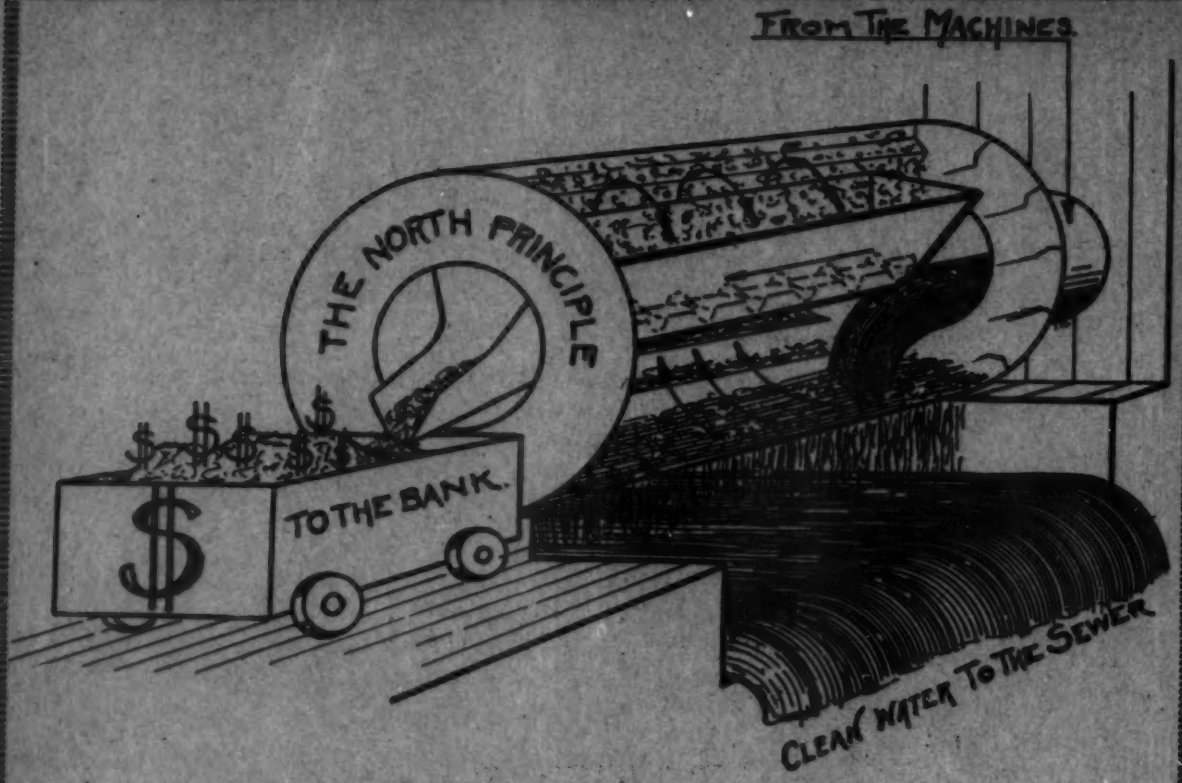
WE take this occasion to thank the whole paper industry for its generous support of our efforts in furnishing such a publication as we believe the industry has needed. It is generally the custom for new trade journals to start with a very limited circulation, and build up from that point. We felt this plan was not treating the advertiser right, and therefore decided to never print less than three thousand copies, and the demand has been so great that these have not been sufficient.

¶ We are having constant requests for April and May issues, but cannot fill further orders for them, as the supply is exhausted. Mills have subscribed in large numbers, as high as fourteen for one company, and this makes us feel that our efforts are appreciated, and gives us courage to strive all the more to be of service.

¶ There are many good things in store for our readers. The August issue will be a much better one than any of its predecessors and no one in the industry can afford to miss it.

Your obedient servant

THE PAPER INDUSTRY



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Vol. 1—No. 4

THE PAPER INDUSTRY

PETER J. MASSEY
Editor

A MONTHLY EDUCATIONAL JOURNAL
Devoted to the Interests of The Paper Industry

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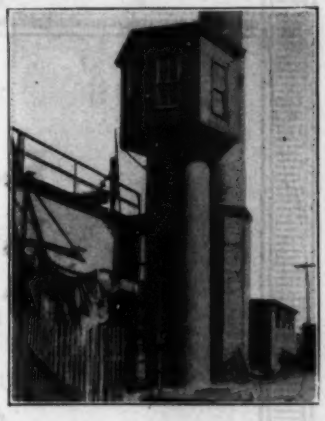

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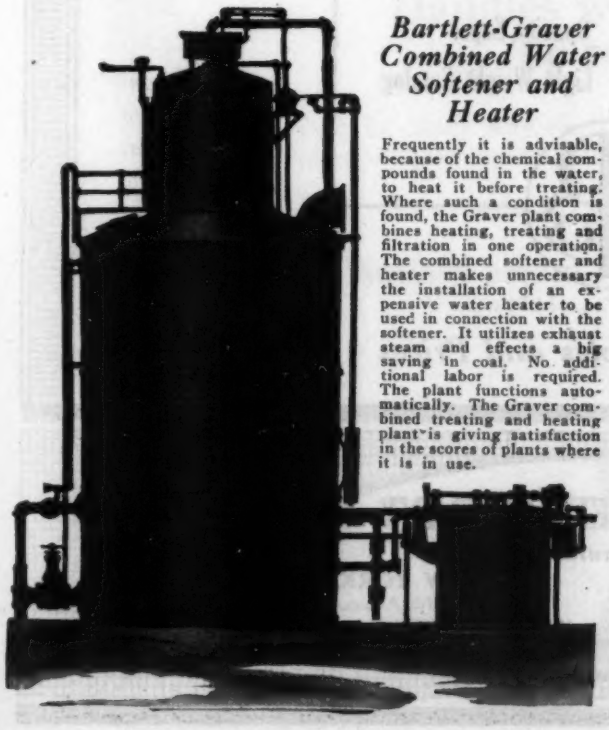

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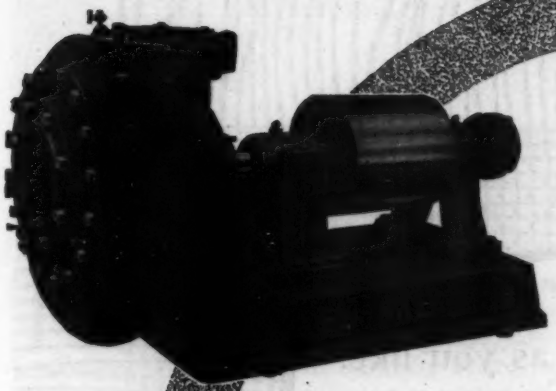

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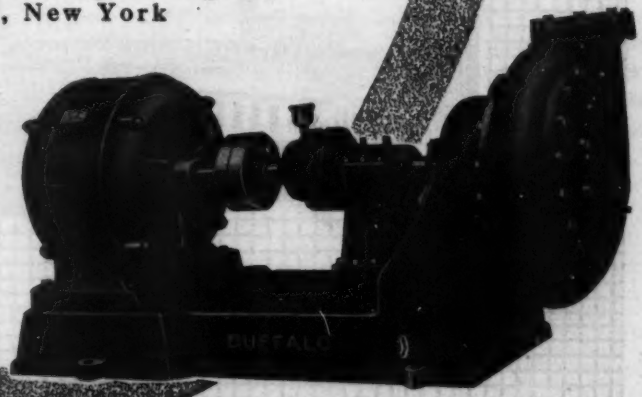

¶ Magnify it as much as you like.

¶ Make any test you wish.

¶ Examine the warp and the woof.

¶ Run it on your machine and you will always find that

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APPLETON WIRE WORKS

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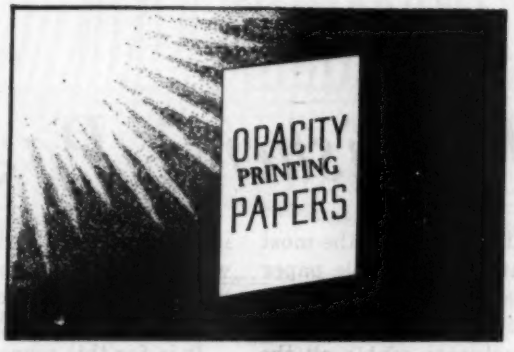
Publishers' Page

THE question of co-operation is one of the most important to the welfare of the whole paper industry. In a speech some time ago, Edward N. Hurley, chairman of the Shipping Board, said: "Too many American manufacturers center all the energy and attention upon their particular establishment and fail to get a broad view of their industry as a whole. Men at the head of factories need the point of view of what might be called 'Statesmanship of Business.' They need to appreciate the fact that their plant is part of the great industry; that their individual welfare depends very largely on the welfare and progress of the industry as a whole and of industry in general. Whatever promotes the welfare of every concern in the industry and the welfare of that broad group we call the public, is bound to react favorably on the individual concern." The keynote of most of the speeches at the different meetings in New York last February was co-operation, showing that this industry is beginning to realize the necessity of working together. The old idea that we can keep unto ourselves and get along in this world is fast losing ground. Possibly the biggest and best lesson to be drawn from the late war is the great value to us of co-operation, that is, co-operation among all the different elements in the paper industry. The manufacturer can do business best by co-operating with the dealer; the dealer can only do business by co-operating with the mill. The manufacturer also must come to the point of co-operation with the large consumer. There is something more for the mill man than simply to manufacture his product and to sell it to the jobber, and then the jobber sell it to the consumer. We have devoted considerable space in THE PAPER INDUSTRY to educational features drawing the manufacturer and large consumer into closer relations with each other. Paper may have the right feel, the right tensile strength, and the right tear, etc., and still may not run properly on the printing press. The mill, therefore, should co-operate with the big user and many problems that come up from time to time can be overcome by this closer co-operation.

It is for this reason that the different associations in the industry are so helpful. The American Pulp and Paper Association is doing a tremendous work for the industry, mainly because it is getting the different manufacturers to co-operate closely together. The Cost Association likewise is extremely helpful because it is endeavoring to get the manufacturers to work on similar lines in finding cost, so that each man may know what his cost is, and thereby prevent price cutting, which would not be done if the manufacturer knew his actual cost. This was the main thought in the organization of the latest association in the industry, that of the American Pulp and Paper Mill Superintendents' Association. There are many problems that come up in the different mills that are similar to problems in other plants that can be discussed and overcome by the superintendents of different mills getting together and co-operating. Cost Finding can be handled successfully only by the co-operation of the superintendent and the men under him. We believe this latter association can be made one of the greatest forces for the good in the whole industry, because it will be composed of the men that are responsible for every pound of material that comes in and goes out of the mills, and surely this being the case, they should not only co-operate closer with every management but with each other, so that many of the general problems that come before them can be handled more successfully in the various plants.

Managers of most of the big mills have seen and realized this and are very much in favor of the superintendents getting together and thrashing out these problems that come before them, which are common to all of them.



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Kalamazoo, U. S. A.

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EDITORIAL

THOSE who have the pleasure of attending athletic contests, baseball and football games, or the opening meetings of schools and colleges, and the giving away of medals, prizes, and certificates, cannot help but see and realize the great benefits that are to be derived from placing a numerical value on competitive effort.

It is hardly necessary to say that the results achieved in sports and in education can only be accomplished through the compilation of competitive figures that will graphically picture the results. Unless the contest is graphically competitive, the best efforts in any line of endeavor are not brought out, and the game is neither interesting to the competitors nor the spectators.

When some renowned athlete competes against time, he is paced by several runners in order to furnish the stimulus of visible competition. This enables him to break the record and at the same time furnish a spectacle that will be of some interest to the spectators. There would not be very much enthusiasm shown nor would very many records be broken if one individual was to circle the track alone and no figures obtained descriptive of the performance.

Can you imagine what would happen to our great national pastime if no record was kept or no results published of the various contests that take place in our major leagues. The pastime would die out for lack of interest. Who would want to go to a baseball game where there was no score kept and no score board?

Paper-making and every other line of productive effort is a game. It only needs the compiling of the results and the graphic presentation of these results as a competitive score to make everyone participating in the game clearly visualize his or her efforts in the total results achieved. It will then be as interesting a game as any competitive sport.

Furnish your workers with a score board, not a bunch of figures and some dry statistics with which any average mortal will be stunned by their very immensity, but a real score that even the least of them may understand and enable them to visualize the part they are playing in the big game.

Give them all a chance to realize that they are not just so many machines with certain numbers, but a part of a large, real live organism that is performing certain essential functions, the most lowly one of which is of vital importance to the success of the most competitive of all games—modern papermaking.

This is no new or revolutionary idea, for it has already been put into practice by a number of mills in connection with their safety first movement, and has met with unqualified success in every instance. Therefore, why limit it to this one small part of the industry, why not extend it throughout the whole game?

To give ourselves a reasonable prospect of success we must realize what we hope to achieve. It is just as important that your organization have a goal to strive for as it is for you individually, for in the last analysis the organization is just as human as the individuals composing it. Let every one of your organization have some object in view, give them a chance to read the results of their efforts. And the whole organization will profit by the friendly rivalry of competitive effort.

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Sole Agents for the United States

327 S. La Salle St., CHICAGO, ILL. **21 East 40th St., NEW YORK CITY**

We're All Right

ONCE again prices of paper are becoming of secondary importance in the minds of both jobbers and consumers. Quality and deliveries are now holding the front place on the stage.

Quality—Never has the quality of different grades undergone such a revision as during the past few months. Formerly only the most discriminating buyers insisted upon uniform quality in their purchases, but now as a result of the war, plus the educational advertising campaigns carried in the newspapers and national magazines on high grade writings and bonds, on standardized book papers and lately on standardized wrappings, the consumers in these various lines having read, marked and learned about them, have begun to digest the claims formulated and placed before them with the result that jobbers everywhere are feeling and recognizing the urge and push toward the new era of paper merchandising, and are in turn demanding better quality, standardized grades and uniform products from their mills.

Surely this is a new condition. More and more, larger and larger, grows the army of consumers of paper who insist on delivery of this brand or that because they know its quality is always dependable and its value constant.

To all its readers THE PAPER INDUSTRY says, make no mistake about this fundamental truth of merchandising, that consumers of paper, like consumers of any other commodity, are vitally alive to and interested in good goods, and are willing to pay good prices and support, with continuous re-orders, a manufacturer or jobber of a grade of paper which has a known and maintained standard of value. Job lots, off runs, misbranded and misrepresented papers are rapidly ceasing to have purchase producing pulls with the big, intelligent buyers. An era of sane, economic paper buying is at hand, and this demand for better quality is one of the evidences thereof.

Deliveries—Of course there was bound to be a congestion of orders at the mills following the revival of business. All the consumers, convertors and jobbers of paper who withheld orders from the mills during the deflation period did exactly what was natural when the revival period arrived—they all moved to the mills together—with the result that most mills now have orders all the way from thirty to sixty days ahead of their machines. For seven months the reducing of stocks went merrily on, and it is impossible to restock in thirty to sixty days, especially in view of a healthy revival of business.

For the balance of the year business in paper will be good and a steady market can be confidently looked for. But make no mistake about it, there is nothing in the situation that justifies a repetition of the 1916 ascension. Buyers in general remember the slump of 1917 and the trying days of overstock marketing from November, 1918, to May, 1919, and this is a good thing. Prices should harden at about the basis of present values, and business will be better off to continue on an even keel.

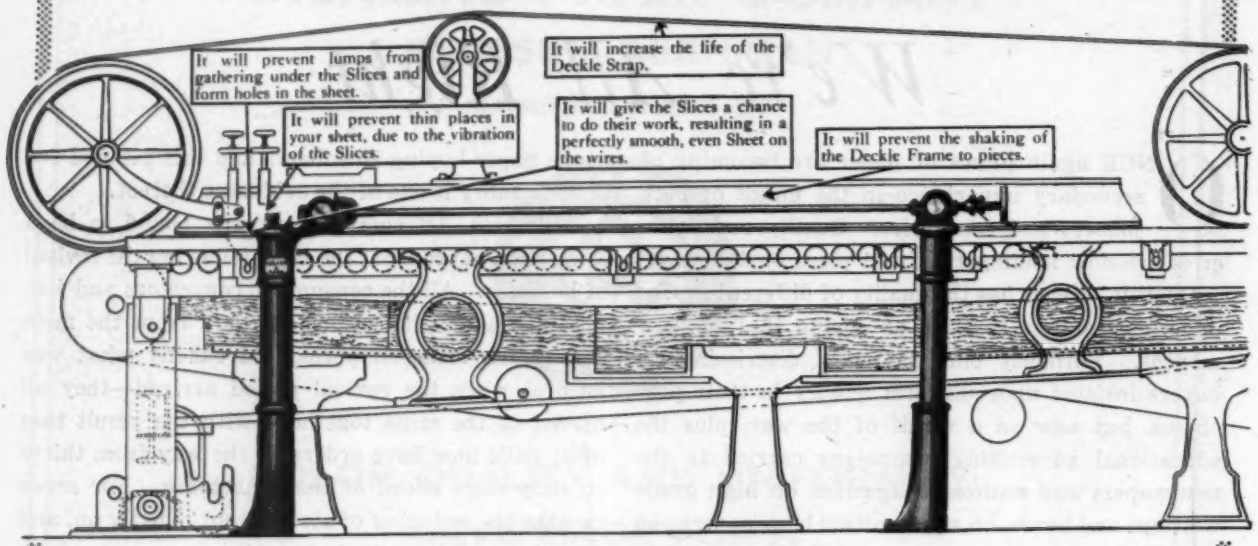
Deliveries are slow only because orders temporarily are in excess of production. The trade needs to be patient, anticipate its needs 60 days in advance, and not to speculate.

There is plenty of production to fill all legitimate wants. Price boosting, which has for its only foundation a temporary but naturally delayed delivery situation, is unwarranted, will react, and in the end compel curtailed production with consequent decline.

This is warm weather to be very busy, we know, but keep your head cool, your feet warm, your pencil sharp, and every problem will factor out satisfactorily.

The Acme Deckle Frame Support

"is indispensable to the making of Good paper"


It will prevent lumps from gathering under the Slices and form holes in the sheet.
It will prevent thin places in your sheet, due to the vibration of the Slices.
It will increase the life of the Deckle Strap.
It will give the Slices a chance to do their work, resulting in a perfectly smooth, even Sheet on the wires.
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It will make better edge, save brakes and take less power.

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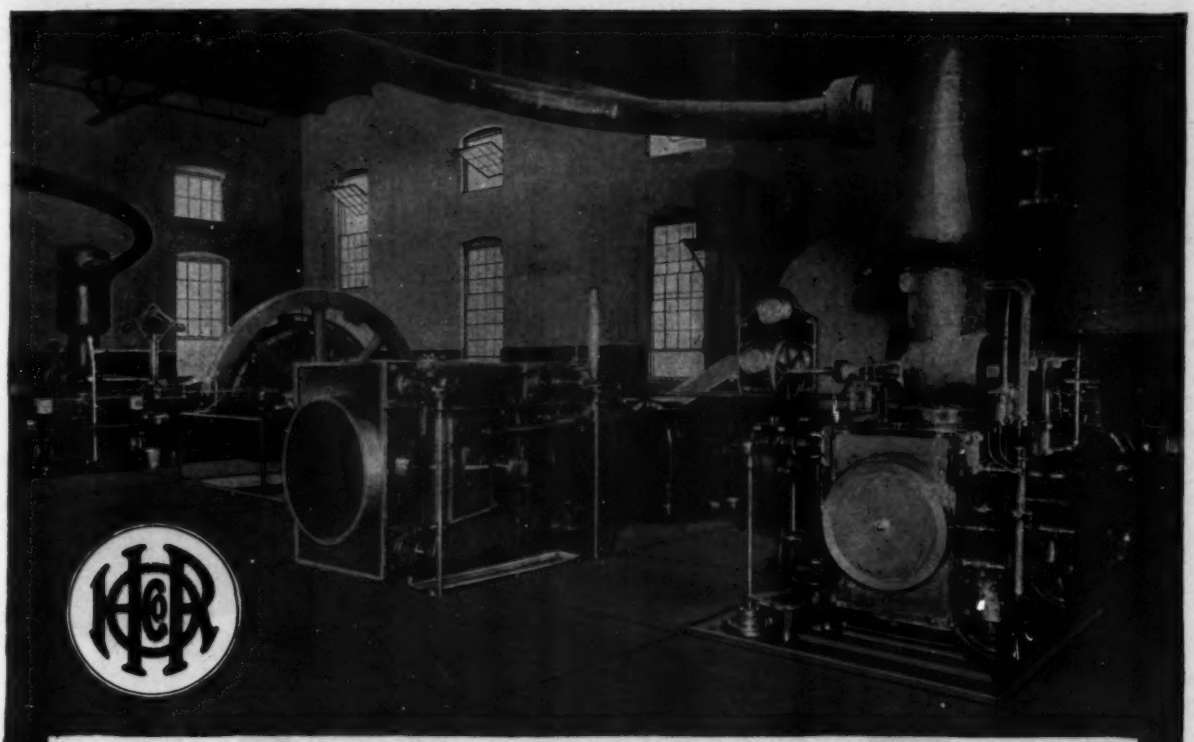
Wringer	Primary Press	Design	

We also manufacture Rubber Belting, Machine Hose, Deckle Straps, Screen Diaphragms, Suction Box Gaskets and Connections.

United States Rubber Company



Cross-Compound "Hamilton" Engine in Federal Strawboard Co., Alton, Ill.

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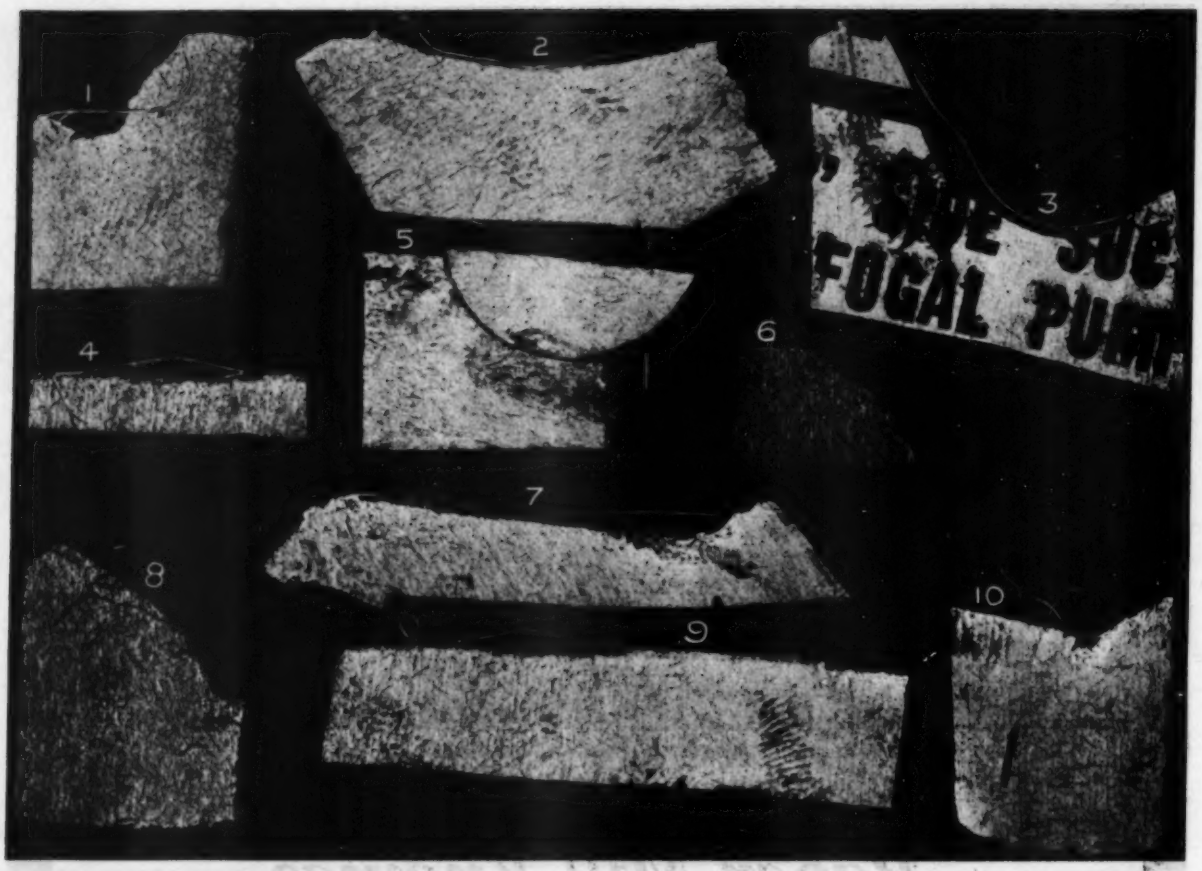
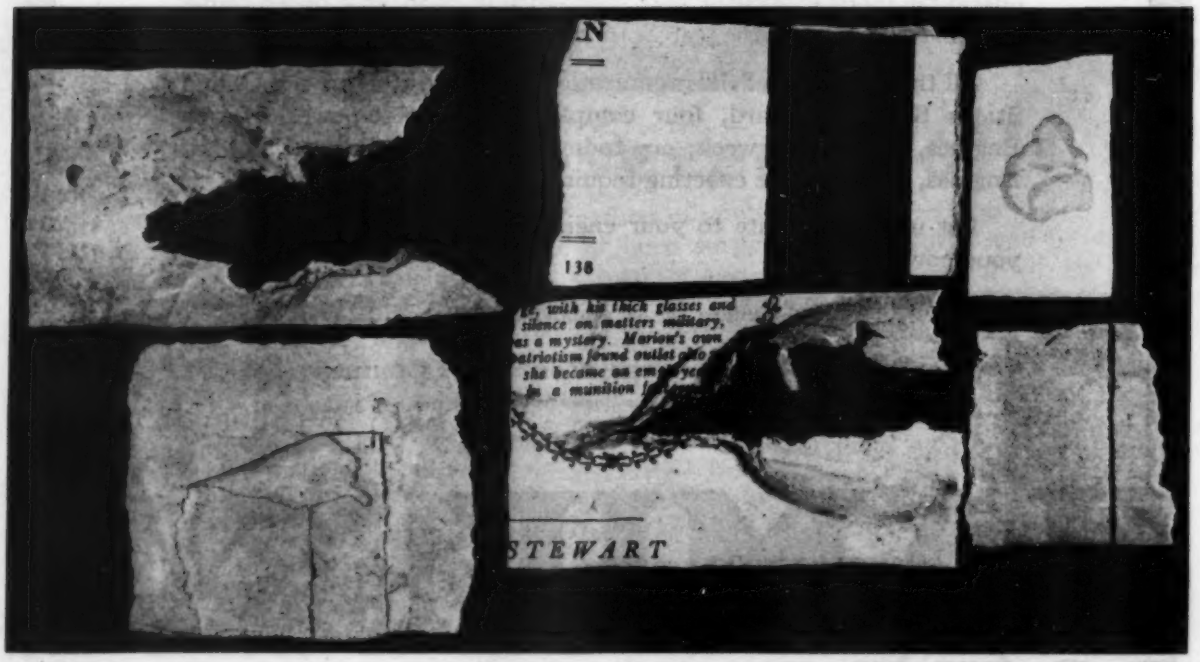


Illustrations showing Hair Cuts in Lightweight Papers. Samples No. 2, 3, 4, 7 and 9 are Hair Cuts caused by Sisal Fibres, the balance are Wool Hairs from the Felts.



Slime holes, imperfect splices and crushed spots that are the cause of web breaks in roll paper

THE PAPER INDUSTRY

"The Educational Magazine for the Paper Industry"

Volume I JULY, 1919 Number 4

Difficulties Encountered in Printing Papers

By PETER J. MASSEY

Part II—"Hair Breaks" in Roll Papers

THIS article deals with some of the causes of web-breaks in roll printing papers, especially that important but least investigated cause known as "hair" breaks; the damage and loss of time occasioned by web-breaks on the newspaper and magazine rotary presses; the competition and origin of the various "hairs"; the methods by which they find their way into the paper; and the possibilities for safeguarding against their admixture with the paper-making fibers that may lead to their elimination.

Hairs of such coarseness and length that they will displace the regular paper-making fibers and prevent proper felting action are introduced at the beater or stock chest and find their way into the finished sheet. These "hairs" lower the tensile strength of the sheet to such an extent that when they happen to be on the outside edge of the roll or one-half to one inch from it, the web breaks or separates at that point while the roll is being unreeled under the tension and high speed of the printing press.

Complaints Not Numerous

That the complaints received by the paper maker have not been as numerous, in regard to this matter, as they have been with poor splices, may be easily accounted for by the fact that the evidence of a break caused by a poor splice is large enough to make it easily visible without any difficulty, while in the case of a "hair" break the cause is so minute that in some instances it is not possible to find the cause when the web breaks, due to the fact that the press is traveling at a high speed when the break occurs and one of the loose ends is lost. Even when the two severed ends of the web can be recovered and the breaking point found, the "hair" that caused the break may have dropped out, and the only evidence of its ever having been present is the clean cut edge and shape of the break.

Web-Breaks a Serious Matter

The breaking of the web is a very serious matter in magazine or catalogue printing, as it very often is the cause of batters or smashes to the printing plates and make-ready that necessitate the making of new plates and loss of time in repairing the damage to the make-ready. While the large units now in use for this class of printing make the loss of one-half hour productive time a very serious matter in all catalogue and magazine rotary pressrooms, the breaking of the web is of vital importance to the newspaper pressroom, where the time schedule is so close that every minute and even every second must be jealously guarded against loss. To enable the pressroom to meet the schedule laid out by the circulation department, it is imperative that the rolls of paper used be as free as possible from breaks of any description in order that connections with railroads and other distributing mediums may be made on time.

Very Costly to Newspapers

A few web-breaks will upset the whole schedule to such an extent that it may cause a large loss to the newspaper. If the loss in productive time is suffi-

cient to prevent the delivery of papers to all the various railroad terminals in time to make trains for out of town distribution, the consequent loss in circulation will be considerable. In newspaper delivery the old adage "Better late than never" does not apply—in fact, it is better never than late, as the public will buy the paper that delivers the news first and at the time when it is most accustomed to receive it. The favorite journal is no longer the favorite when it is late on the news stands. The public will not wait until it finds time to make its appearance, but will take the one at hand, and perhaps change their allegiance to the rival paper that does deliver its news on time, making the loss a permanent one. A delay of fifteen minutes may mean the loss of thousands in circulation.

Electrical Recording Devices

Electrical devices are now installed in the majority of newspaper pressrooms, that not only stop the press automatically whenever a break occurs, but also record the number of breaks in each roll or each shipment in order to furnish the purchasing agent actual figures regarding the relative value of two shipments or between shipments from two or more different sources. The most important qualification for newsprint paper is undoubtedly freedom from breaks so as to permit the printing press to run at its maximum speed, and keep up to the schedule of deliveries laid out for it by the circulation manager.

Press Crew's Efficiency Lowered

The printing press crew's efficiency is measured by the daily production chart. Their ability to keep the press running steadily enough to enable them to turn out their publication on schedule time depends in a large measure upon the speed and dexterity shown in leading through the sheet through the press whenever a break occurs in order to start up again with minimum time loss. This is the principal factor in their efficiency. The first and principal duty when a break occurs will not be to discover the cause of the break, but to get the press started again as quickly as possible, instead of wasting several minutes searching for the reason why the break had occurred.

Should the breaks occur too frequently, complaints will then be forthcoming to the paper mill, with statements to the effect that the paper contains too many breaks, but in very rare instances will the complaint be accompanied by enough evidence to enable the paper mill to make an analysis at the mill laboratory to determine the cause so that an investigation might be made and the proper measures taken to eliminate the trouble.

Complaints Without Evidence

Should the printer receive a complaint from his customer that the presswork on his job was poorly done, without giving any specific reason for the decision and no marked copy to back up the assertion, the printer would be just as much at sea as the paper maker is, when the printer complains of web-breaks without producing some of these breaks in their entirety in order that the cause may be determined, for it cannot be expected of the paper maker to remedy a fault upon which no evidence can be presented.

These facts are so clearly obvious that they should inspire the printer to adopt some more logical course than the one heretofore pursued and make some effort to investigate any deficiency in the paper so that he may be enabled to present the matter to the paper manufacturers in an intelligent manner. This will assist in a very large degree in bringing about a perfect understanding between printer and paper maker.

The Cause of Some Misunderstanding

Paper mill representatives who have not had some practical training in paper manufacture are at times the cause of increasing the misunderstanding. For when they are called upon by the printer for advice in the matter of paper difficulties their decisions and the subsequent reports made to the mill are based on snap judgment and guesswork instead of experience.

Some time ago a shipment of paper in rolls received by a publishing house gave considerable trouble in the pressroom, due to numerous web-breaks which averaged well over seven breaks per roll. After several rolls had been tried out with the same results, the mill representative was called in to investigate, as the lost time, waste and the effect on the morale of the press crews had assumed serious proportions. The only apparent cause for the breaks was small, clean cuts at right angles to the edge of the sheet, varying from one-quarter inch to one inch in length. Notwithstanding that the cuts were of various shapes and clean cut, the decision was to the effect that they were caused by calendar cuts and so reported to the mill, while the real cause of the trouble was wool hairs from the felts.

The Reasons for Investigation

The decision to make an investigation of web-breaks, in order to determine the various causes and suggest methods whereby they might be prevented, was based on a number of instances similar to the one above stated, and the value of an investigation of this character was based on personal, practical experience in large rotary pressrooms, and intimate contact with paper makers manufacturing printing papers.

An investigation that would determine the cause would give the paper manufacturer the necessary fundamentals upon which a method or plan of procedure could be based. It would then be possible to remove the cause of the trouble, as it is self-evident that no effect can be remedied without removing the cause. Especially is this true in the case of web-breaks in roll papers, which may be from a multitude

of causes, any one of which can, in itself, be responsible for the effect complained of.

Loss of Productive Press Hours

The loss of productive press hours and smashed printing plates caused by web-breaks impressed the writer with the necessity for an investigation, whereby some determination might be made of the composition, origin and causes of the breaks in order that some suggestions might be brought out that would assist in their prevention. The difficulties to be met with by any methods that might be adopted for an investigation of this subject are threefold; the length of time that must expire before a number of representative breaks can be collected for investigation; the necessity of having the cumulative experiences of a number of pressrooms with paper from a large number of mills, in order to make the investigations truly representative, and the difficulty to recover the loose ends of a break on a high-speed rotary press without seriously interfering with the output.

Methods of Procedure

An outline of the method of procedure in order to show relative value of this investigation is as follows:

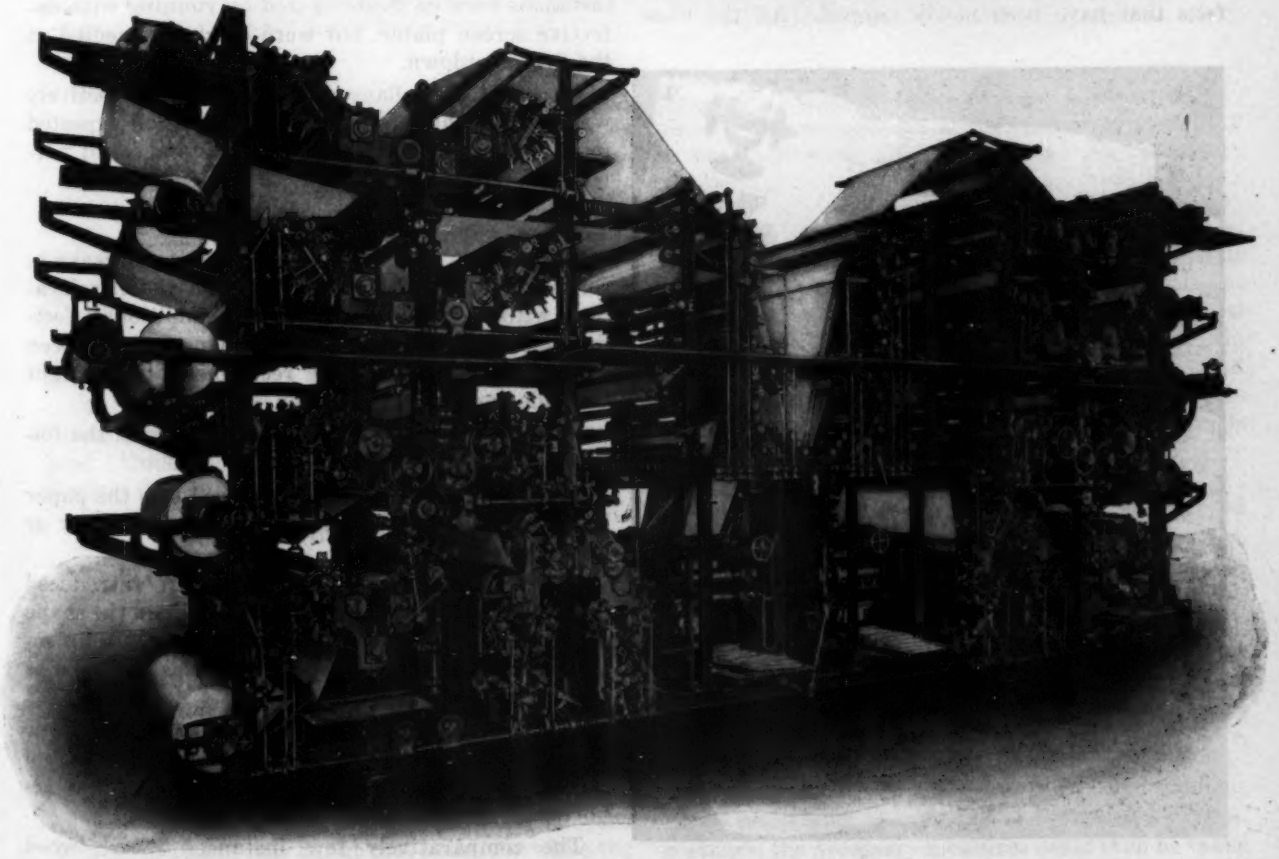
Personal observations and investigations extended over a period of four years in a large pressroom using a variety of papers furnished by twelve different mills, and the cumulative experience of three other large pressrooms for a period of six months. The results from all the pressrooms and the specimens collected compared close enough to be well within the percentage of error that could be allowed in consideration of the conditions under which the investigations were made. But they cannot be considered as more than approximate figures, as in no pressrooms did the subject receive undivided attention, the subject being handled by pressroom executives in addition to their regular routine duties and responsibilities.

Lightweight Papers

The investigation was limited to light weight newsprint and book papers, with a weight basis ranging from 19- to 50-pound stock, as it was found that on heavier papers than 50-pound basis breaks from this source were negligible, due to the fact that the hairs did not displace enough paper-making fibers in a thick sheet. While the tensile strength of the paper at that point was materially lowered, there was still sufficient felting of the remaining fibers to overcome the tension on the printing press.

Classification of Fibres

The specimens collected were examined individually and the composition of the hair was determined by



A modern octuple newspaper press, where eight reels are running simultaneously. The breaking of one web will cause a loss in the productive time of the whole unit

microscopical examination and checked against standard slides. The following results were obtained from the specimen examined: Wool, 34 per cent; sisal, 47 per cent; slivers, 8 per cent; all other fibers, 11 per cent.

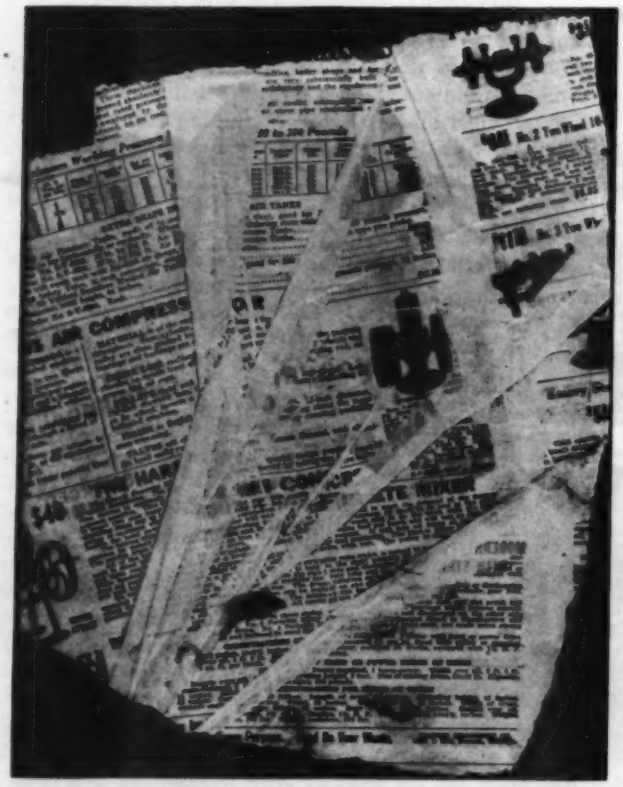
Wool Fibres

The origin of the wool fibers was ascribed to the paper machine felts as the only possible source of wool fibers in the mill, and an investigation was begun in order to determine the means whereby they could become incorporated into the stock.

While it is possible for some of the fibers from the drier felts to become detached from the fabric through friction, and attach themselves to the sheet as it passes over the driers, the fiber so introduced would be easily recognized, owing to the fact that the regular paper-making fibers which it displaced would be crushed by the pressure of the calendar rolls. On all but one of the specimens received no such crushing was evident. In every case the wool fiber had displaced the regular furnish in the sheet formation; it therefore must have been introduced before the stock flowed onto the wire.

Conclusions Drawn

The cause was finally laid to the saving of the wash water, when washing new wet felts, or wet felts that have been newly napped. All the loose fibers washed off by the showers are then pumped into the stock and finally find their way into the finished paper.



This break was the cause of a battered plate and one hour's lost time. The offending hair cut from the left hand corner is reproduced on page 258, sample No. 3

The Cellulose Fibres

The cellulose fibers consisted almost exclusively of sisal fibers, the origin of which was arrived at by the process of elimination. The mills using sisal and manila twine in their finishing room for packing purposes were the only mills whose product contained "hair cuts" from this source and had the most complaints on the subject of "hair breaks."

Cuttings, clippings or individual fibers found their way into the broke box and then into the beater. The comparatively short period of beating necessary for broke when introduced into the beater did not materially change the sisal or manila fibers, with the consequence that they entered the sheet in practically the same condition that they left the broke box.

Wood Slivers

Wood slivers are not the important source of trouble that one would be led to believe from the many complaints of breaks ascribed to this cause, as during this investigation it was only in very rare instances and then in only the one shipment from any one mill that slivers were the source of breaks. These isolated instances were no doubt caused by running with defective screen plates, but were quickly remedied at the first shutdown.

All other miscellaneous fibers taken collectively were well within the percentage deviation expected in any article of commerce from a standard of perfection.

Summary

The various fibers that are the cause of breaks in roll print papers, their determination and classification, with special reference to the conditions affecting their introduction into the papers, have been studied in order that some recommendations might be made for their elimination.

It has been found that the fibers are from the following sources:

(1) The wool fibers are introduced into the paper by saving the wash water used in washing new or newly napped wet felts.

(2) The sisal and manila fibers are introduced into the paper by means of the broke box in the shape of single fibers, cutting or trimming, from the finishing or machine rooms, where this class of rope is used in bundling.

(3) The wood slivers were not the important source of breaks in roll paper that would be expected from the number of instances where this cause was reported as the source of the trouble.

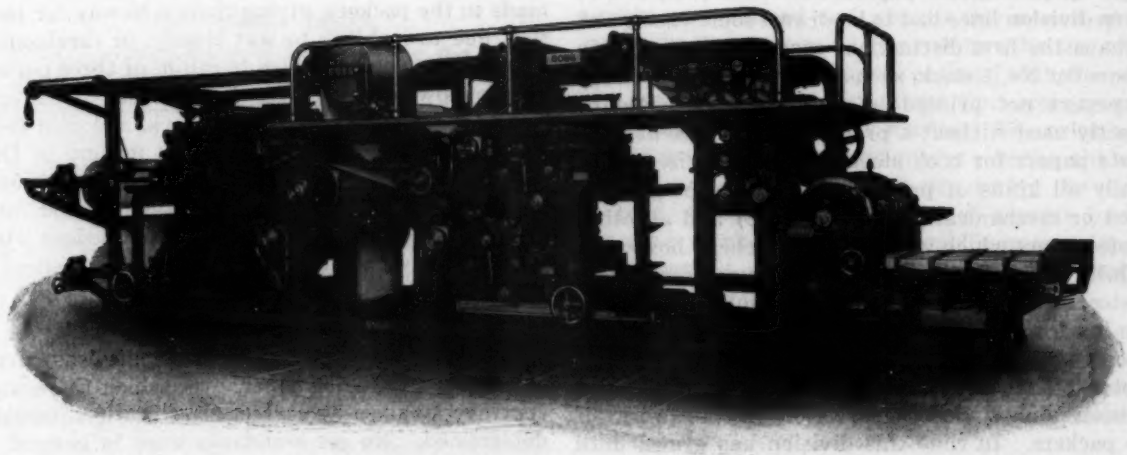
The comparatively few instances where wood slivers were the cause of breaks is credited to the occasional loosening of the screen plates, which allow

a small percentage of the stock to pass through without screening.

(4) The other miscellaneous fibers can be ascribed to the sweepings around the mill, such as twine string and cotton waste for wiping, finding their way into the beaters.

The recommendations for the elimination of the above are:

(1) The wash water from the washing of new or newly napped felts or jackets should not be recovered, or at least not used as back water for dilution of stock.



An 80-page unit magazine rotary press. As all the current magazines are profusely illustrated with half-tones, the breaking of the web on a magazine press may batter the fine screen of the printing plate to such an extent that it will necessitate the making of new plates and cause considerable lost time in replacing the damaged make-ready

(2) Elimination of all sisal and manila twine from use in the mills manufacturing light-weight newsprint or book papers.

(3) Sand traps and stock screens should be inspected regularly to insure against loose or defective screen plates.

(4) Sweepings from machine or finishing rooms should be placed in receptacles provided for that purpose. Under no consideration should sweepings be dumped into the broke box.

Breaks From Other Sources

One of the accompanying plates illustrates various other causes for web-breaks that do not come under the category of "hair breaks," one of which is slime holes. While slime holes are objectionable in any part of the reel, as they foul the type and fill up the half-tone dots, they are particularly objectionable when they happen to be within an inch from the edge of the roll, as it means a sure break on the press. The back tender should be exceedingly careful in placing markers in the reel for every slime hole, and the third hand should tear out at that point, for while the slime hole may be small and come through in the center of the reel, it may be very close to the edge of the finished roll when the reel is slit to size on the winder.

Three illustrations of imperfect splices are also shown. One pictures what happens when a splice is made without sufficient lap. The tape squeezes out and holds four thicknesses of paper together. This will either cause a break in the web or, if carried through to the printing cylinders, will smash the make-ready and batter the plate. Another shows the tape adhering to only one end of the splice, due to the fact that either the sealing iron was not hot enough or not enough pressure was exerted over the full width of the splice. This splice was from a 60 basis book paper from a mill that had been running almost exclusively on light weights, and can be attributed to the fact that the third hand had not taken into consideration the fact that the heavier paper required more heat and pressure than was necessary with the light-weight paper. Out of a shipment of 62 rolls not more than 20 splices were strong enough to carry through the printing press without breaking.

The remaining illustration is a crushed spot caused by dirty calendar doctors. Keeping the doctors clean will effectually prevent any accumulations from dropping on the sheet and being crushed into it by the calendars.

In this and the preceding article on "Difficulties Encountered in Printing Papers," it has been my endeavor to cover as thoroughly as possible one of the chief sources of trouble with printing papers. This phase of the subject was chosen not only on account of its importance but because it appeared that if the paper maker could be made to realize its importance, the necessary measures could then be taken to eradicate the causes of web-breaks.

The Value of Waste Paper Stock in the Manufacture of New Book Papers

By EDWARD T. A. COUGHLIN, B.S., CH. E.

(*Continued from June Number.*)

Classification of Old Papers on the Market

UNTIL recently no definite standards or distinct classes were deemed necessary in the classification of waste papers. Of course, one or two sharp division lines had to be drawn somewhere, and perhaps the first distinctions made were (a) waste papers for No. 1 stock, such as shavings and cuttings of papers not printed upon, and which could be directly used without a preliminary treatment; (b) waste papers for book stock, which comprised practically all kinds of printed matter, except groundwood or mechanical pulp papers; (c) and all other waste papers which were made into cheap boxboard.

Quite naturally paper manufacturers using these wastes, especially book paper men, noticed that certain grades of papers produced a more uniform and cleaner sheet, and so discriminated in their selection of stock. This brought about a more and more graded division and a closer inspection in the work of the packers. In time this division has grown until at the present time we have the following grades of waste papers with their own prices, which fluctuate according to the season and the demand:

Quotations of the week of October 9, 1915:

No. 1 hard white shavings	$2.40–2.50
No. 2 hard white shavings	2.00–2.10
Ledger, solid books	1.75–1.85
No. 1 soft white shavings	1.75–1.80
Ledger stock	1.40–1.50
Magazine, flat	.85– .90
Unstitched, flat	.95–1.00
Crumpled book stock	.70– .75
White blank news	1.05–1.10
New manila envelope cuttings	1.50–1.60
New manilas	1.30–1.40
Manilas, extra	.90–1.00
Manilas, No. 1	.65– .75
Manilas, No. 2	.35– .45
Bogus wrappers	.42½– .45
No. 1 mixed papers	.30– .35
Ordinary mixed papers	.25– .30
Over issues	.50– .55
Folded news	.35– .40
Box makers' cuttings	.30– .35
Telephone books	.25– .30

Even with these distinct grades the mills are continually being annoyed with shipments of papers that do not approach in quality that which is specified in the orders. It is realized that it is almost an impossibility, if there is to be any profit at all, for the usual packers to grade as closely as it is necessary in order to use the stock without subsequent mill sorting. Such is true, especially in the magazine, book, and mixed ledger grades. In these items an allowance is made to the packers, giving them a leeway for insertion, due to inability to sort closely, or carelessness, or whatever you may wish to call it, of three per cent of groundwood. All over this amount is deducted from the original price of the stock, and paid for as "print." In the magazine stock a margin of three per cent is allowed for book stock which may be found on sorting. All over this percentage is paid for as ordinary book stock. In the mixed ledger stock, which is very hard to grade the same allowances are made.

Standards Adopted

For a long time considerable dispute was current as to how a grade of paper, over which there was a controversy as to its correct classification, should be determined. No set standards were in general use among the packers until The Theodore Hofeller Company of Buffalo, N. Y., issued a set of standards which were found to be entirely satisfactory to all the trade. This classification is as follows:

No. 1 Book and Magazine Stock

"No. 1 Books and Magazines—must be free of ground wood paper, parchment paper, leather and cloth book covers, magazine covers made of dark colored paper, school paper, paper shavings, photogravure paper and free of books with burnt edges. The following are some of the books and magazines which will not be accepted as No. 1 books and magazines: Ainsley, Argosy, All Story, Blue Book, The Cavalier, Pearsons, Popular, Red Book, Top Notch, Railroad magazines, catalogs from mail-order houses, cheap novels, telephone books, etc. Thick books, the size of Dun's Agency books, should be ripped apart, making each part the thickness of an ordinary magazine.

Ledger Stock

"Ledger stock consists of high class writing paper, account books, ledgers, letters, checks, bonds, insurance policies, legal documents, etc. The paper may be white or tinted, it may be torn into two or three parts, but it must not be torn into small pieces. Covers must be removed from the books and ledgers. The following will not be accepted as ledger stock: postal cards, school papers, telegrams, envelopes, parchment paper, tissue paper, copying books, manila

paper, colored paper, railroad bills of lading, freight bills, ledgers and books with burnt edges.

Mixed Paper Stock

"Mixed paper consists of clean dry paper from stores, offices, schools, etc.; it may include wrapping paper, cardboard boxes, paper book covers, pamphlets, No. 2 book stock, telephone books, crumpled newspapers, envelopes, paper torn into small pieces which is not good enough for book stock or ledger stock. The paper must be free of excelsior, sticks of wood, iron, rubbish, strings, rags, leather or cloth book covers, and in fact, free of all material which cannot be manufactured into paper.

Newspaper Stock

"Folded newspapers must be clean, dry, flat, folded newspapers, such as come from private homes, newspaper offices, newsstands, libraries, etc. Pamphlets, mixed paper, and crumpled newspaper will not be accepted as folded news."

Subdivisions of Standard Grades

In book paper mills, there is a considerable variety in the grades of paper made and so this variety calls for a difference in the quality, usually, of the old papers to be used in the furnish. Most mills have only two grades, which they call their No. 1 and No. 2. The No. 1 being made chiefly from ledger stock, or solid ledger books form a very fine sheet. The No. 2 papers are made from magazines and books and though a good sheet may be made from this stock it does not, of course, command the same price as No. 1. Then these two grades are sometimes subdivided into further classes by calling the paper made Extra No. 1 or 2, and special No. 1 or 2. This difference is made by the use of high grade ledgers and No. 1 school books, or by a variation in the pulps used.

Cost Fluctuation

The fluctuation in the costs of the different grades of waste papers presents an interesting study and is a direct indicator of conditions among the mills. For instance the price of No. 1 magazine stock has been averaged for each month during the years of 1907-1912:

	March	June	September	December
1907.....	$0.80-0.90	$0.75-0.85	$0.80-0.85	$1.00-1.10
1908.....	.90- .95	.75- .80	.85- .90	.85- .90
1909.....	.90- .95	.80- .90	.80- .85	.85- .90
1910.....	.85- .90	.70- .75	.70- .75	.75- .80
1911.....	.60	.60- .65	.60- .65	.85- .90
1912.....	1.00-1.05	1.10	.90	.90

At present the price of No. 1 magazine is $1.10-1.15, which is called a normal price for the fall and winter seasons of the year.

Seasonal Variations in Price

A glance at the above figures shows considerable variation. This is said to be due primarily to the supply and demand and also to the season of the year. In the spring and summer months the collections increase and the supply on hand with the packers increases to such an extent that storage costs demand a ready and quick market. The price naturally drops. In the fall and winter months, the mills having stocked up to full capacity during the season of good collecting, there is not such a great demand for paper stock. The prices should increase owing to the increased difficulties in collecting and such is usually the case.

However, this is not so with the higher grades of ledger and shavings. This is not such a flexible commodity and the price is usually governed by the available supply, and the ruling price of rags or bleached sulphite.

Available Supply Increasing

In these five years, for which prices have been averaged 1907-1912, there is not a sufficient increase to warrant saying that the price of paper stock will advance if the number of mills using waste papers increases. There has been a remarkable growth in this field of paper manufacture in the last ten years and as yet we have no grounds to fear that high prices will become general if the mills change over to the introduction of waste papers in their furnishes. It is simply a condition that has been met with an increase in the paper jobbing line for handling waste papers; the more mills using old paper—the more will be the increase of waste paper stock dealers.

(Continued in August number)

The Most Versatile Equipment for Pulp and Paper Mill Yard Work

By L. A. BABCOCK

IN these days of big production on established, efficient and profitable lines the greatest problem confronting the pulp and paper mill is the performance of the hundred and one jobs of handling in and about the yards, such as the handling of pulp wood, coal, sulphur and other raw materials.

The economical handling of these materials necessitates the installation of various mechanical equipment, the proper choice of which will not only accomplish the tasks with less labor and costs, but will also dispense with the worry and uncertainties of coarse labor, such as scarcity, strikes and layoffs.

One of the most versatile machines on the market today is the auto-crane, a light, powerful, portable steel derrick that can be operated with steam, gasoline or electricity with equal efficiency, and can be mounted on broad road wheels, rail trucks or caterpillars.

The auto-crane has been a necessity in every mill where there is enough material to be handled to keep it busy. As it will work night and day and do the work of twenty men for the same number of working hours, the initial expenditure of installation will be warranted if you can keep it busy, as the daily cost of maintenance, depreciation at 6 per cent and all other operating costs under normal conditions will not exceed $10 a day.

These machines are the most versatile on the market today, and will go to the work wherever it happens to be. They will unload your cars, rehandle from stock piles, coal, timber, metal, machinery or finished product can be handled to advantage. It will operate with clam-shell, grab or drag-line buckets to handle coal, cinders or for excavating work.

With wood grapple or wood hook it will handle your logs; with a magnet it will handle metal scrap; with a bottom block it will handle machinery and castings; it can also be used as a pile-driver, skip or shovel dipper.

The principal feature of an equipment of this kind is that its usefulness will not be confined to tracks, but will go anywhere about your yards to perform whatever work you may have for it to do, whenever you wish to have it done.

An auto-crane handling coal; one of the many jobs it can be used for in the paper mill yards

The Suitability of Second Cut Cotton Linters, Cotton Shavings and Hull Fiber for Paper Manufacture

By OTTO KRESS,
In Charge Section of Pulp and Paper of Forest Products Laboratory, Madison, Wis.
and
SIDNEY D. WELLS,
Engineer in Forest Products

For Presentation at the June Meeting of the Technical Association of the Pulp and Paper Industry.

THE Salvage Board of the Ordnance Department, U. S. Army, recently requested the Forest Products Laboratory, Madison, Wisconsin, to assist, if possible, in determining the value of cotton linters and hull shavings for the manufacture of paper pulp. The War Department had on hand, at that time, a large tonnage of munition linters and cotton shavings bought by the Government for the production of nitro cellulose. With the ending of the War, the Salvage Board was concerned with the proper disposal of these raw linters and shavings and also of a much smaller amount of bleached linters prepared in a condition ready for nitration. The available supply of Government linters and shavings has just recently been sold, but the possible production of a large annual tonnage of second cut linters and hull shavings makes these products of decided interest to the Paper Industry.

The writers are aware that second cut cotton linters have been used in the past, to a limited extent by the paper industry and that their use was discontinued by the introduction of the cheaper wood pulps. Conditions, however, have changed, the oil mills have installed to a large extent (in view of the Government needs for fiber for nitro cellulose production), the necessary equipment to receive a larger cut of second cut linters and hull fiber than was ever removed under pre-war conditions. Bleached sulphite and soda pulp will not return to the pre-war selling price and with the increasing cost and scarcity of pulp wood, the writers believe that second cut cotton linters and hull fiber can successfully compete in quality and price with chemical wood pulp and certain other paper stocks.

Cotton linters before the outbreak of the European War, were largely used as a stuffing material for pads, mattresses, upholstery, horse collars, cushions, etc. Other large uses were for the manufacture of smokeless powder both for Army and sporting purposes pyroxylin, varnishes and plastics and for a number of other minor uses. During the European War, cotton linters were largely diverted to the manufacture of gun cotton and smokeless powder. On the entry of the United States into the War, the oil mills co-operated with the Government by taking off a larger cut of linters and shavings and turning them over to the proper officials for allocation.

The writers are not familiar with or experienced in the operation of the oil mills where cotton linters and hull shavings are produced, but the following information was obtained from a personal interview and correspondence with some of the largest producers of these products.

The cotton seed after having passed through the ginning process for the removal of the long staple cotton is shipped to the oil mills. In general, the cotton seed has adhering to it approximately 200 lbs. of fiber per ton of seed. Prior to 1915, it was generally customary to take off a cut of 40 lbs. to 60 lbs. per ton of seed, the balance being left adhering to the hull. With the increased demand for linters occasioned by the tremedous production of nitro cellulose, it was found that with more adequate machinery the output of linters and hull shavings might be increased to 180 lbs. per ton of seed. It was estimated that the output per ton of seed, during the years 1915-1919, averaged 125 lbs. per ton of seed against a pre-war production of 40 lbs. to 60 lbs. per ton of seed.

The raw cotton seed and the seed after the removal of varying amounts of fiber, is received at the oil mills and has approximately 200 lbs. of fiber adhering per ton of seed. After having been passed through the regular linter machine for removal of 75 lbs. of mattress lint, is then passed through a special delinting machine where an extra cut of from 75-100 lbs. is removed by means of carborundum wheels or plates. This lint is practically free from hull fragments. Unfortunately only a specimen of a few pounds of this sample was received at the Laboratory, and no pulping trials were made of it. The freedom from hull fragments and comparatively long fiber would make this an extremely interesting possible raw material, as it could undoubtedly be pulped with a lower chemical consumption than either of the shipments of the Government hull shavings or the hull fiber received from Memphis, Tennessee. Partly delinted hulls that have had a 75 lb. cut, and the seed kernels which are pressed for oil

recovery have an additional 75 lb. cut removed by passing the hulls between steel attrition mills which shave or cut the lint from the hulls. This hull fiber was pulped and produced a good grade of pulp.

The following figures taken from Bulletin 137, Bureau of Census, Department of Commerce, clearly indicate the tremendous increase in the consumption of linters.*

1909	149,185	bales
1910	177,211	"
1911	206,561	"
1912	238,237	"
1913	303,009	"
1914	307,325	"
1915	411,845	"
1916	880,916	"
1917	869,702	"
1918	1,118,840	"

*A bale of linters weighs approximately 500 lbs.

There is evidently available for the peace time demands of the country, a supply of over 700,000 bales for uses other than for which cotton linters have been used in the past. At 500 lbs. to the bale, this corresponds to a production of 175,000 tons, equivalent to a little less than 600 tons of raw material per day (on a basis of 300 working days per year).

Considering the possible production of second cut linters and shavings in relation to the total tonnage of cotton seed annually crushed by the oil mills gives another method of arriving at an estimate of the total amount of fiber available to the paper industry.

There is an annual production of approximately 4 to 4½ million tons of cotton seed. Assuming that all of the oil mills installed the necessary equipment and removed a 100 lb. cut of de-lint or hull fiber (after first cutting a 75 lb. cut for the mattress trade), there would be available annually 200,000 tons of this product or a little more than 650 tons per day. This estimate is based on information supplied by various producers and the calculation made on the crushing of an annual production of four million tons of cotton seed.

Further, there is no object in not attempting to utilize this fiber, as leaving it on the seed is detrimental in the subsequent extraction of the oil from the seed. Neither has the fiber any feeding value when mixed with the cotton seed meal. The increase in fiber yield above 75 lbs. per ton of seed means, of course, that the average length of the fiber is less and that a percentage of small hull fragments will be present. The fiber, however, is of better length than the ordinary high grade paper fiber, while the hull particles can be removed practically completely by proper cooking of the fiber.

The Laboratory received through the War Department a shipment of cotton linters and hull shavings. A microscopic examination of the raw shavings revealed the following interesting data:*

*The writers wish to acknowledge the services of Miss G. J. Griffin of our Laboratory who made these and the other fiber measurements.

Average length of fiber	2.41 m.m.
Longest fiber	8.00 m.m.
Shortest	.51 m.m.
Fibers under 1 m.m.	16%
Fibers under 5 m.m.	88%
Fibers over 5 m.m.	12%
Average length of fibers under 5 m.m.	1.83 m.m.
Average length of fibers over 5 m.m.	6.69 m.m.

One hundred small black specks to seven fibers with occasional larger fragments of hulls.

The raw linters on microscopic examination gave the following fiber length data:

Average length of fiber	4.62 m.m.
Longest fiber	25.44 m.m.
Shortest fiber	.80 m.m.
Fibers under 5 m.m.	74%
Fibers over 5 m.m.	26%
Average length of fibers over 5 m.m.	10.89 m.m.
Average length of fibers under 5 m.m.	2.39 m.m.

One black speck to 60 fibers.

Pulping trials were also made on a shipment of hull fiber obtained through the courtesy of cooperating oil mill at Memphis, Tennessee. This fiber has already been described as representing a 75 lb. cut (after removal of a first 75 lb. mattress cut by an ordinary linting machine), produced by passing the hulls after the removal of the meats or kernels between steel grinding or attrition plates.

Microscopic examination of this fiber yielded the following data:

Average length of fiber	2.06 m.m.
Longest fiber	6.50 m.m.
Shortest fiber	.54 m.m.
Fibers under 5 m.m.	96%
Fibers over 5 m.m.	4%
Average length of fibers under 5 m.m.	1.88 m.m.
Average length of fibers over 5 m.m.	6.5 m.m.

Six hundred fragments to twenty fibers.

In view of the apparently high content of hull fragments in this fiber, an ash determination was made which showed 1.95 per cent ash based on the bone dry fiber. Bleached waterleaf paper made from the hull fibers reduced by the sulphate process showed an ash content of 0.29 per cent.

An ether extraction showed the raw fiber to contain 3.10 per cent of ether soluble material based on the bone dry weight of the fiber. This loss on ether extraction represents the small amount of oil, wax, coloring matter, etc., present in the fiber and hull fragments. The ether extract was of a slight yellowish color. Alcohol, as might be expected, produced a brownish colored solution on extraction as the cotton coloring principles are readily soluble in this solvent.

In view of the low bleach required to bring the various pulps to a high degree of white and as the fiber (not considering the hull fragments) contains only a small percentage of impurities, some bleach

determinations were made directly on the raw stock. Using an excess of bleach, the stock was readily bleached to a fair degree of white, the hull fragments changing from a black to a yellow color. By this treatment, the bleach loss based on the bone dry stock was 4.7 per cent. This determination is of interest as indicating the high cellulose content of the raw material.

Pulping trials were made on the linters, shavings and hull fibers in a 70-gallon rotating iron digester supplied with direct and indirect steam. After digestion, the pulp was blown into the blow pit and the pulp washed, pressed and put through a hammer type shredder and sampled for yield. Bleach determinations were made at this point to estimate the bleach required to bring the pulp to a standard white.

The pulp was broken and washed for one hour in a 25-pound hollander equipped with a drum washer by means of which considerable fine material and liquor residues not removed in the blow pit were washed out. The drum washer was then raised and the bleaching powder solution added. During the bleaching period, which lasted 40 minutes, the stock was circulated with the beater roll well above the bed plate. The bleaching action was accelerated by adding very dilute sulphuric acid about ten minutes after the addition of the bleach. At the end of the bleaching period the stock was a brilliant white in comparison with the appearance of bleached sulphite and soda pulp, and the drum washer was lowered and the stock washed for forty minutes, after which no traces of bleach could be detected. The behavior of this fiber on bleaching is decidedly different from the bleaching of soda or sulphite pulp not only from the standpoint of low bleach consumption but from the extreme rapidity of the bleaching action, the bleaching action commencing and proceeding directly on addition of the bleach liquor.

A two-pound sample of the pulp from cooker was removed from the blow pit before washing the pulp in the usual manner with hot water. This two-pound sample was allowed to cool in a small screen for about 40 minutes and then washed with cold water. Bleach trials on pulp washed with hot water in comparison with the bleach required for the pulp washed with cold water showed that the latter required practically twice the bleach consumption to bring it to the same degree of white as was required for the sample washed with hot water. Evidently, allowing the pulp to cool to room temperature in contact with the black liquor produced a decided darkening of the pulp, requiring practically double the amount of bleach than pulp from which the black liquor was removed at once by washing with hot water. This apparent absorption of the coloring matter from the black liquor was called to our attention by the experience of manufacturers of bleached munition lint.

At the completion of the treatment mentioned above two charges of the bleached and washed stock were transferred to an improved hollander type beater of fifty pounds nominal capacity and beaten four and one-half hours. During the first hour, the roll was brushing lightly, during the next three hours it was lowered very gradually, and during the last half hour it was brushing hard.

After the beater treatment the stock was dumped into the stuff chest of a 15-inch Fourdrinier paper machine and run into a sheet of waterleaf paper, no color, size or alum, or material other than the stock itself, being used. Representative samples of the papers obtained were seasoned and tested for strength in a constant humidity room at 70° F. and 60 per cent relative humidity.

Microscopic examination of run A on cotton shavings shows an average fiber length of 3.23 m.m.; run F on cotton linters shows an average fiber length of 5.27 m.m.; while run Q on hull shavings has an average fiber length of 2.06 m.m. The average fiber length of spruce sulphite pulp is less than 3 m.m., while that of aspen soda pulp is less than 1 m.m.

Cooks A, B, and C were made in a stationary digester using both direct steam and indirect jacket steam. During the pulping period circulation of the liquor was obtained by means of a centrifugal pulp. This treatment gave an evenly cooked pulp. In the cooking of linters, however, considerable difficulty was experienced in the blowing of the pulped linters since the circulation of the cooking liquor by means of the centrifugal pump apparently felted the linters into a compact mass. All of the other cooks with the exception of cooks 2 and 3 were made in a rotating digester supplied with direct and indirect steam. No difficulty was experienced in blowing these cooks.

From a study of the pulping data and with the reservation that the data represent only the results from semi-commercial trials, the following conclusions may be drawn:

1. Cotton shavings similar to the shipment received by the laboratory can be successfully pulped by the soda process, yielding a high quality of pulp. For 100 lbs. of bone dry shavings, using a maximum digester pressure of 100 lbs. and using 12 lbs. of caustic soda, the pulping operation will be completed in a total digester period of four hours. The yield of bone dry pulp will be 70 per cent and the bleach consumption to bring the pulp to a good white color will not exceed 4 per cent, calculated as bleaching powder with 35 per cent available chlorine. The pulp loses considerable fiber by washing with the drum washer in the beater, so that our yield of paper from the raw shavings showed a final figure of 55 per cent, based on bone dry weights.

2. Cotton linters of the grade shipped to the laboratory will require 9 lbs. of caustic soda per 100 lbs. of bone dry cotton at 100 lbs. digester pressure, with a total time of cook of four hours, giving a yield of 90 per cent of bone dry pulp. This pulp can be bleached to a high degree of white consuming not more than 2 per cent of bleaching powder, calculated as 35 per cent available chlorine. The washing

losses, bleach losses, etc., will reduce the yield of finished paper as collected, on the reel of the paper machine, to 70 per cent based on the bone dry weight of the original raw linters.

3. Hull fiber of the grade furnished the laboratory can be successfully pulped with 18 pounds of caustic soda or a total of 15 pounds of caustic soda and sodium sulphide per 100 pounds of bone dry material with a steam pressure of 90 pounds in from three to four hours, giving a yield of from 65 to 75 per cent of bone dry pulp. This pulp can be bleached with from 5 to 8 per cent of standard bleaching powder and the washing and bleaching losses are such that a production of from 47 to 51 per cent of finished paper on the reel may be obtained, the yield being based on the original weight of the raw hull fiber.

Cooks N, 2 and 3 were made on a shipment of linters received from St. Louis and were from a different source than the Government linters on which the majority of the pulping trials were made.

Cook K was made with 31 lbs. of sodium carbonate per 100 lbs. of bone dry linters. With a high digester pressure of 100 lbs. and a pulping time of four hours the resulting pulp showed numerous specks from the undigested hulls, clearly indicating that a more drastic pulping agent was required.

Cooks L, M, N and Q were made by the sulphate process which gave a high yield of high quality pulp with a saving of from ten to seventeen per cent of alkali, in comparison with the soda cooks made under similar cooking conditions. The greater the amount of non-fibrous, non-cellulose material that must be removed, the greater the advantage of the sulphate process as is manifest in cooks Q and R on hull fiber. Both were cooked at the same steam pressure with the same sized charge of 11 pounds of material per cubic foot of digester space and 52 gallons of liquor per 100 pounds of material. The charge of the alkali in cook Q, the sulphate cook, was 15.2 pounds per 100 pounds of material, and the total time of cook was three hours, while in cook R, the soda cook, the alkali charge was 18 pounds per 100 pounds of material and the total time of cooking four hours. As would be expected, a larger yield of pulp was obtained under the milder cooking conditions of the sulphate cook, the yield being 74.4 per cent against 67.6 per cent with the soda cook. Notwithstanding this, the bleach necessary with the sulphate cook to produce a standard white was 5 per cent, against 8 per cent for the soda cook. It, therefore, seems evident that the sulphate process is capable of removing the foreign non-cellulose matter more rapidly with less attack on the cellulose than the soda process, and that the fiber obtained can be bleached to a standard color with a lower consumption of bleaching powder.

The main difficulty experienced in all the pulping trials was the complete removal of the hull fragments by digestion without injuring or destroying the fiber. The chemical consumed during the pulping of shavings and hull fiber is mainly required for the reduction of the hull fragments. No duster was available at the laboratory, but the writers are convinced that by passing the raw fiber through a proper duster that a considerable separation of the hull fragments could be made, thereby making possible reduction of the severity of the pulping conditions and saving in chemical, steam and time. Another difficulty easily avoided when pulping hull fiber is the danger of charging too much material per cubic foot of digester space to permit free circulation of the cooking liquor and consequently an even digestion of the fiber. With the material used, 11 pounds bone dry weight of fiber per cubic foot of digester space was found to be the maximum that could be safely used. A liquor volume of at least 52 gallons per 100 pounds of material was also found necessary to insure sufficient liquor for circulation.

For comparative purposes, two paper machine runs were made on bleached linters prepared at the Government plant at Nitro, W. Va., for the manufacture of smokeless powder. We understand that the following conditions were used at Nitro in the purification of this material:

Raw Material—75% linters, 25% hull fiber.

Caustic Soda—21 lbs. per 100 lbs. raw material.

Concentration in Digester—26-27 g.p.l. Na OH.

Volume of Liquor—95 gallons per 100 lbs. raw material.

Steam Pressure—72 lbs. per square inch.

Time Coming Up to Pressure—1½ hours.

Time at Pressure—2 hours.

Bleaching Powder Used—2½ lbs. per 100 lbs. pulp.

Yield Purified Cotton—75% of weight raw material.

This material has been given a much more severe treatment than the typical runs on similar material in this series of experiments, especially in the amount of caustic soda used, half of which must have been present in the black liquor in the free state. For paper making purposes, a much less severe treatment is necessary.

One machine run was made on the material as received and a cream colored sheet was obtained similar in strength and other properties to the other runs of this series, but contaminated by too many dirt specks to pass for a high grade quality of book paper. The material for the other machine run was bleached with 1 per cent of bleaching powder and washed with a drum washer. The paper obtained was considerably improved but still too dirty for a high grade of book paper.

The quality of the pulp produced and the ease of bleaching make second cut cotton linters, shavings and hull fiber extremely interesting as a possible source of pulp for the higher grades of paper. An ideal book stock could be prepared by pulping the second cut linters, shavings or hull fiber separately.

(*Continued on page* 278)

Development of Wrought Pipe and Its Importance in the Paper Making Industry

By E. E. KELLER

POWER is recognized as one of the more important factors of paper making, yet how many paper makers can be found with definite knowledge regarding that most important ally of power generation and transmission wrought steel pipe?

The paper maker is dependent on wrought pipe in many direct and indirect ways though he may not always be aware of them. His rolls may be driven by individual motors, yet wrought pipe is required to generate the power for those same motors—or the rolls themselves may have required large diameter pipe for a basis. The uses for pipe about a paper mill are so numerous that the paper maker should be highly interested in the development and characteristics of modern wrought pipe.

The history of pipe starts very early and could possibly be traced to the use of the hollow bamboo for conveying water. Coolie gardeners still use this method where the distances to be covered are short and no great pressure is required. Other early means of piping were the clay and terra-cotta tiles of the Aztecs and Egyptians, the stone conduits and lead pipe of the early Romans, and the bored logs of our own forefathers.

Probably the first imperative need for iron tubes was for the manufacture of gun barrels. After the invention of gunpowder, the first cannons were made of bronze, and early Spanish cannons are wonderful examples of metal-working skill in ornamentation.

But this was too expensive a material for gun barrels, and the need for cheaper material brought out the earliest application of wrought iron for tubes.

In the early history of wrought iron tubes, the only known method consisted in bending an iron plate or strip to form a "skelp," and the edges were welded together piecemeal by a smith hammering the red hot metal over a rod or mandrel. A rather expensive and tedious process.

In 1812 an Englishman named Osborn patented machinery for "welding and making barrels of firearms and other cylindrical articles."

The skelp was raised to a welding heat in an open or closed fire and, after the mandrel has been inserted, it was then placed in the swage or anvil, and welded by the action of a tilt hammer.

The inventor states: "I take a skelp and place it in either of the beds, according to the part required to be welded, and which welding is effected by the swage segment performing half a revolution."

This is believed to have been the earliest form of machinery for welding iron tubes. But as may readily be seen the process was not very rapid, and in the next two or three years a new necessity arose for iron tubes in quantities.

About the time of Osborn's invention for tube-welding machinery another Englishman was perfecting his process of making coal gas for lighting purposes.

This was the first important attempt to secure strong metallic tubes made by Murdoch, the inventor of illuminating gas, in England, about 1812. To convey the gas about the streets of London, he employed old gun barrels, screwed end to end, to form continuous tubes; a goodly supply of this material being available at the close of the Napoleonic wars. Later, various methods of making lap-welded tubes by bending hot strips of metal around a rod or mandrel were developed, but it was not until 1825, when Cornelius Whitehouse invented a method of butt-welding pipe, that the manufacture of tubes on a practical commercial scale was instituted.

The first wrought steel pipe was made about thirty years ago, in relatively small amount, but today the wrought steel pipe used is in the neighborhood of 2,000,000 tons annually. This heavy tonnage denotes widespread usage, as it is a singularly uniform, strong ductile product.

It has a uniformly low, even carbon content which does not vary more than .01 per cent in a year's work. The metal of which it is made has an average tensile strength of about 58,000 pounds per square inch; elastic limit of 36,000 pounds per square inch; elongation in eight inches of 18 to 24 per cent, and reduction in area of approximately 50 per cent. It is attacked by acids, sulphides and alkalis at high temperatures.

The physical properties are points which should concern every paper maker who is interested in the most efficient operation of his plant. They are factors which preclude many shutdowns due to the repair work frequently required on inferior material; and they give a large factor of safety under forced pressures and other abnormal though sometimes necessary conditions.

Practical men in every line of endeavor are coming to realize more, every day, that wrought pipe is something more than a piece of metal with a hole in it, and paper makers along with the others should give the problem of piping the same careful consideration that they give to their many other problems of intensive production.

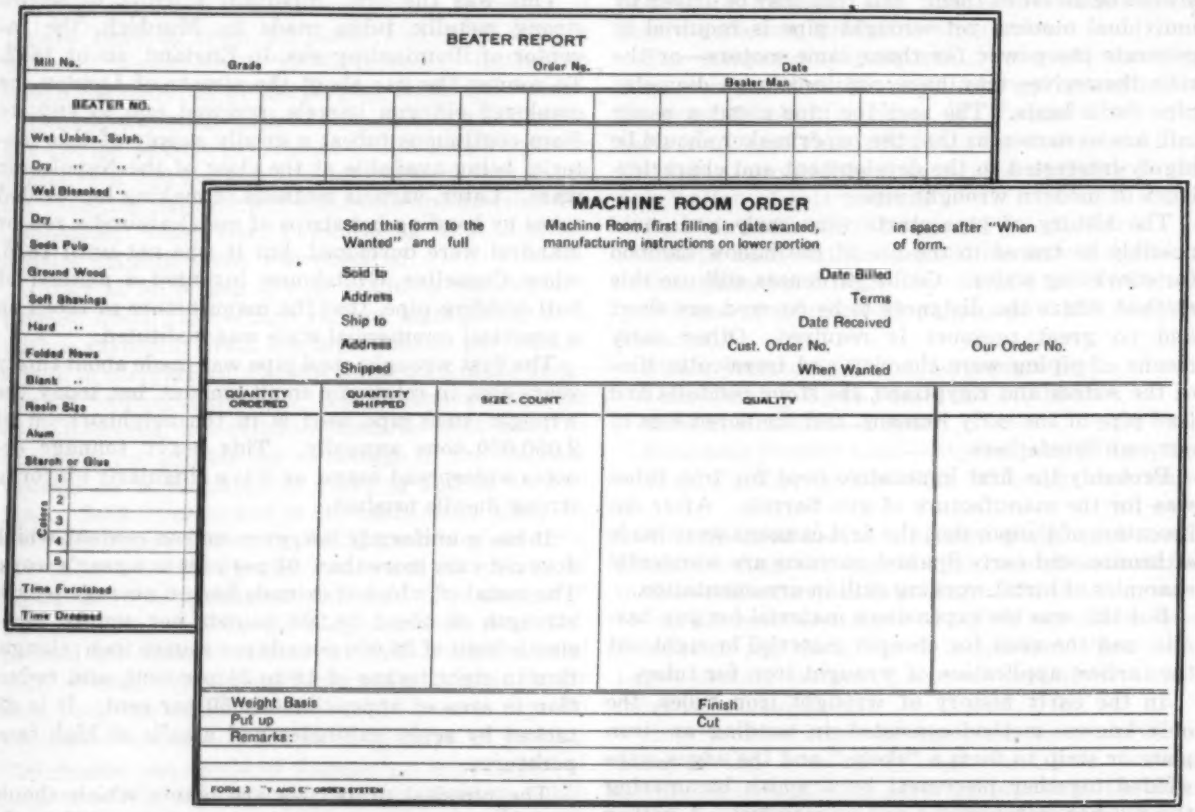
System for Paper Mill

By F. C. CHRISTENSEN

COST systems for the use of Paper Mills, while they are all the same in principle and fundamentals, differ from one another in a great many ways. The large mill of many units will necessarily need a more elaborate system than the small mill of one or two machines, and the mill making an assorted line of colored papers will need a much more refined system than the mill making one line all year around.

A cost system for a mill making one line of product differs from the cost system used by manufacturing concerns in other lines of industry in the simplicity of its application, because in the paper mill it is not possible nor is it necessary to charge time or labor against each individual order, as the working force of the paper mill does not vary from day to day or month to month. Everybody employed in the mill puts in his time in making the one line of product or in handling the finished product. In regard to the raw materials, the same is true, as the materials used by the mill are the same on every order. These facts make it a comparatively simple matter to install a cost system into a mill having but one line of product.

The paper mill to have a successful cost system must know exactly the general mill burden or overhead in order to determine the correct charge against its product; the conversion cost, which means the cost of labor and machine hours, to convert the raw material to finished paper; the exact cost of raw material for every pound of paper made; the finishing room cost and the cost of packing and shipping. A cost system that will give accurate figures on the above costs, no matter how simple it may be, will let you know exactly at any time the exact cost of producing your finished paper; any system no matter how elaborate and costly could not give you more.



BEATER REPORT

Mill No. Grade Order No. Date

Beater Man

BEATER NO.												
Wet Unbles. Sulph.												
Dry												
Wet Bleached ..												
Dry												
Soda Pulp												
Ground Wood												
Soft Shavings												
Hard ..												
Folded News												
Blank ..												
Resin Size												
Alum												
Starch or Glue												
Colors 1												
Colors 2												
Colors 3												
Colors 4												
Colors 5												
Time Furnished												
Time Dropped												

MACHINE ROOM ORDER

Send this form to the Machine Room, first filling in date wanted, in space after "When Wanted" and full manufacturing instructions on lower portion of form.

Sold to Date Billed

Address Terms

Ship to Date Received

Address Cust. Order No. Our Order No.

Shipped When Wanted

QUANTITY ORDERED	QUANTITY SHIPPED	SIZE - COUNT	QUALITY	

Weight Basis Finish

Put up Cut

Remarks:

FORM 3 "Y AND E" ORDER SYSTEM

The paper mill to have a successful cost system must know exactly the general mill burden or overhead in order to determine the correct charge against its product; the conversion cost, which means the cost of labor and machine hours, to convert the raw material to finished paper; the exact cost of raw material for every pound of paper made; the finishing room cost and the cost of packing and shipping. A cost system that will give accurate figures on the above costs, no matter how simple it may be, will let you know exactly at any time the exact cost of producing your finished paper; any system no matter how elaborate and costly could not give you more.

When mill costs for making your paper are known, it is an easy matter to establish your selling price, by adding to your mill cost the delivery charges, which consist of freight, storage and cartage costs; the selling expenses, such as commission and advertising, the discount you give your customer and profit you expect to receive for the service you have performed in supplying this commodity.

The material costs should include such items as handling and storage to arrive at the actual costs up to the time of use and carried on a perpetual in-

ventory that will be checked back with the regular bookkeeping system. A form record for keeping an accurate record of raw materials is the basis of the cost system so far as the raw material is concerned.

The principal and most important charge in a paper mill is the conversion charge, as this includes all the actual paper making operations. To be of any real value, the co-operation of the superintendents is necessary to see that the correct information is given on the Form Sheets for each department.

The Form for the Beater Room reproduced here can be used not only by the mill making one kind of paper, but also by the specialty mill making a number of papers. Just as soon as the mill is ready to begin work on an order, one or more of the Beater Room Reports are made out and given to the Beater Room Engineer or Superintendent. It is filled in at the top showing the number of the mill, grade of paper to be made up, customer's order number and the date. Columns are for indicating by number the various beaters that are to be filled with the raw material. After the different items listed in the left hand column a check is placed, to indicate just which of these raw materials goes into the different beaters. The grade and quality is also noted. The weight of the material is noted in the column under the number of the Beater. These Beater Forms should be cross referenced with the raw material chart. Each Beater Room report should tally as to amount of material used with the amount of raw material requisitioned from the raw materials department.

The Paper Machine is the most important point in the paper mill, as every pound of material and all expense in its preparation must come through that important point. The measure of efficiency of your whole organization is the tonnage that can be produced on the paper machine. If your machine can turn out more paper by increasing your other equipment, you buy that equipment.

The record of your paper machine is the most important record in your possession, and should be valued accordingly. The machine ticket reproduced here gives the number, date, order number on which the paper is being made, and the grade of paper run. On the lower portion of the form is arranged the numbers of the persons employed on the machine, the running time and the tonnage produced. In a mill running short runs and specialties, a new ticket should be made out for each run. In the mill making only one grade of paper a ticket for each tour is sufficient.

All machine tickets should be filled out by the machine tender and O.K.'d by the machine room superintendent or boss machine tender, and both held equally responsible for the accuracy of the report. By placing the responsibility directly up to the ma-

Our Bill Order No. Customer's No. Production No. Date Packed Date Shipped

Bill to Ship to

Route

	Rolls	B'dls.	Case No.	Reams	Size and Weight	Grade	Gross	Tare	Net	Nom.	BILLED WEIGHT M	BILLED WEIGHT P	Price	Amount

MACHINE TICKET

Mill No. Date 191 Order No. Grade Customer Tour 1 2

Deckle	Trim	Size	Weight

Supercalendered	Machine Finish
Mch. Tender	
Back Tender	
3'd Hand	
Cutter Boy	

Running Time

Time Started		A. M. P. M.
Time Finished		A. M. P. M.
Time Elapsed		

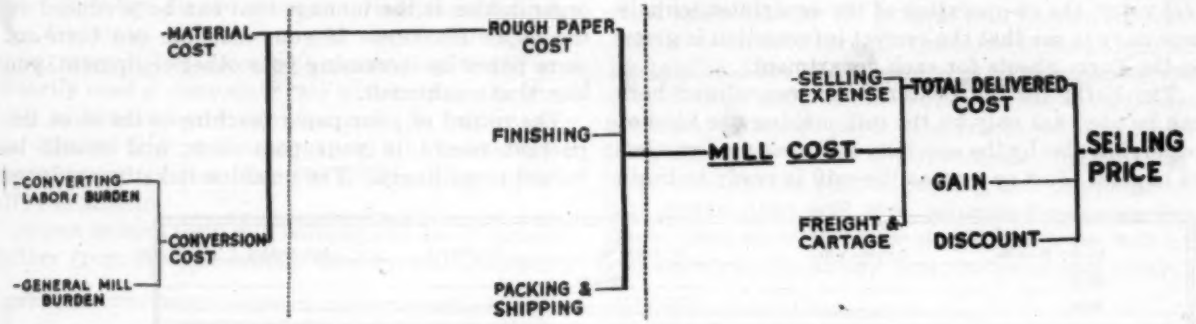
Down Time

Time Started			
Time Finished			
Time Elapsed			
Superintendent's O. K.	Cause	Cause	Cause

Set Number	Weight	Set Number	Weight	Set Number	Weight
1		13		25	
2		14		26	
3		15		27	
4		16		28	
5		17		29	
6		18		30	
7		19		31	
8		20		32	
9		21		33	
10		22		34	
11		23		35	
12		24		Total	

chine room heads on each tour, the report will be of real value, which it would never be if every one of the machine crew had a hand in the filling of it out, and the responsibility scattered through the machine room.

It is the custom in most mills to summarize their production of finished paper stock each day or week in order to check back the raw material and machine room reports. A form for this purpose is reproduced here.



In any mill where an efficient cost system is operated intelligently, the influence for order, neatness and thrift is inestimable. It will furnish a check on and encouragement for efficiency; enable the mill to establish a selling price with some degree of intelligence, and furnish an exact record of profit or loss.

A simple small mill with one line of product should be just as vitally interested in a cost system as the mill with a large number of machines and a varied line of product, for it is just as important, if not more so, for the small mill to know its cost of production, in order to enable it to make the right selling price, as it is for a large mill.

Method of Interfolding Paper

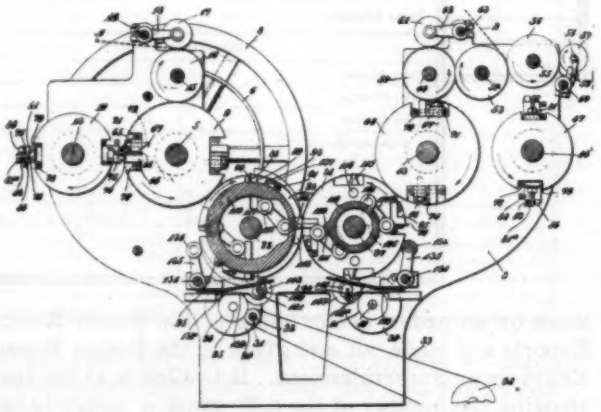
Patent No. 1,302,241 granted to Clyde E. Swick and assigned to the Hawley Pulp and Paper Co. of Oregon.

An invention relating to a method of interfolding paper or similar material, to produce folded sheets suitable for use as towels, toilet paper, etc.

The object of this invention is to provide such a method of interfolding paper adapted to produce packs of folded sheets, said packs being so arranged that when one of the lower sheets of the pack is folded downwardly, it is readily removed from the pack end, and at the same time, withdraws the free end of the next succeeding sheet of paper so that said next succeeding sheet may be readily withdrawn in a similar manner from the lower end of the pack. Such packs of folded sheets are customarily retained in a box having an open slot at its bottom so arranged that the free edge of the lower-most sheet projects through the slot so as to permit the removal of the sheets, one after another, in the manner above described. The box or means used for retaining the pack of folded sheets for use, however, forms no part of this invention.

While the steps carried out in my method of interfolding paper are capable of being performed by many different types of mechanism, for purposes of describing such method I have shown the machine disclosed in my co-pending application, Serial No. 54,828, filed October 8, 1915, entitled Paper interfolding machine, of which this application is a division, and in the drawings—

Figure 1 is a side elevation of a machine made in accordance with my invention.



CLAIMS

1. A method of interfolding paper which comprises partially severing webs of paper at alternate points along their lengths, and folding the webs at each of the partially severed points.

2. A method of interfolding paper which comprises partially severing webs of paper at alternate points along their lengths, and folding the webs at points intermediate the points on each web which have been partially severed.

Paper and Paperboard for Offset Printing

By HARRY L. EVEREST

THE offset process has progressed so rapidly and the demand for offset papers has grown so extensively that a definition of the process calling attention to the qualities demanded of a paper for this purpose will be of interest to every manufacturer of book papers.

Every paper manufacturer who has undertaken to supply paper for this purpose without first becoming thoroughly acquainted with the needs of this process has found that it is not an easy task, and that the few who have suceeded in producing a paper that gave perfect satisfaction were the men who had made a very careful study of the principles and conditions involved so far as it related to the paper used.

Offset Process Defined

The offset process is the application of the rotary principle of lithography, brought about by the demand in all industries for higher speed and greater production. This was made possible through the development and perfection of the metal plate as a substitute for the Solenhofen litho stone. The metal plates are of zinc or aluminum, and while both metals give in most instances identical results, there are certain conditions where one or the other metal is preferable. With heavy solid forms aluminum is used, while in ordinary commercial work zinc is preferred.

Offset lithography is a distinctive art very closely related to lithography in the fundamental principles involved, being a planographic process, and is related to letter-press printing by the high speed of the presses used in its production. While there is some relationship, the difference between it and the above processes is even more radical than the difference between kraft, soda and sulphite pulp.

Fills a Distinctive Need

That the process has filled a distinctive need is proven by the fact that it now occupies a position between photogravure and letter-press printing, and is an ideal medium for the production of art subjects, postal cards, small booklets, catalog covers, inserts, magazine covers and all advertising literature. It has supplied a long-felt want to the reading public, as with this process both reading matter and illustrations can be produced on paper with antique finish. It does not rely on so-called art papers for its artistic results as does letter-press printing and lithography.

Detail and Tone Without Coating

In the development of half-tone printing special heavily loaded, coated and calendered papers have been in demand, as it was necessary to have a smooth, even surface in order to get the full value of the half-tone illustration to bring out the design with clearness of detail and sharpness of outline. The ideal paper for the higher class of letter-press printing is not paper at all, but two mineral surfaces, interspersed with enough paper-making fibers to impart the necessary tensile strength to the sheet in order that it might withstand the calendering, supercalendering and the subsequent printing and bookbinding operations. The highly glazed surface of coated and heavily loaded papers, so universally used for half-tone printing, are not only objectionable on account of the eye fatigue occasioned by the glare from their highly polished surfaces, but also for the drastic effect they have on the printing plates.

Wear on Printing Plates

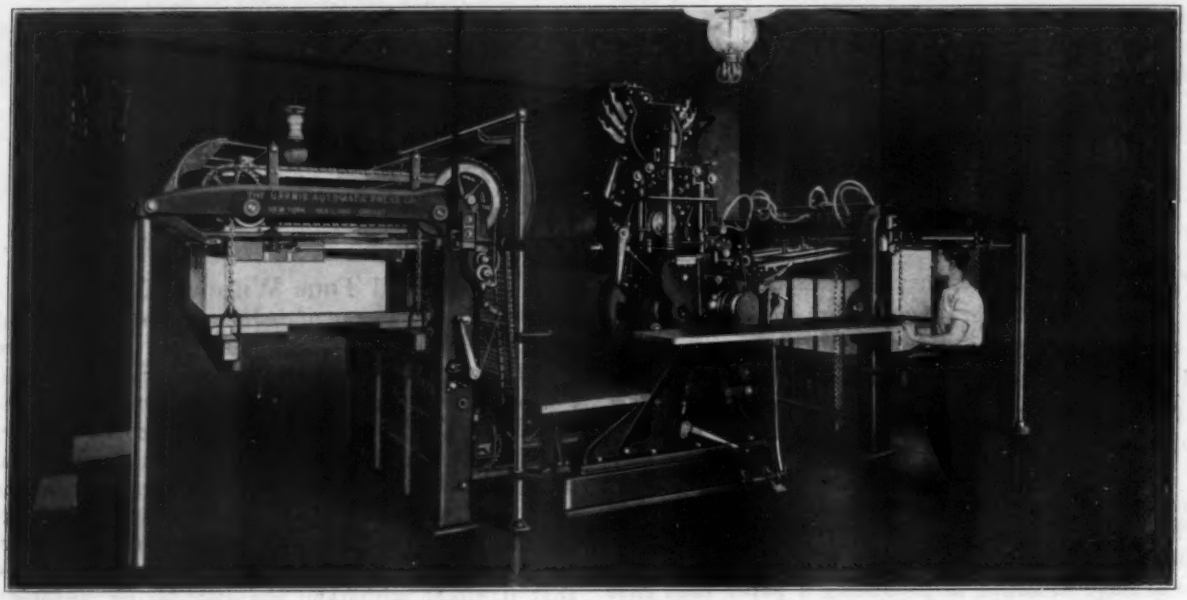
In the case of ordinary M. F. book paper, a million or more impressions may be run with one set of electrotype plates with practically no wear, while in the case of a coated sheet 50,000 impressions will wear out the nickel-type plates, even when great pains are taken with the make-ready by expert pressmen. With the offset process rough, antique, coarse paper or board will give a perfect solid and sharp impression with one-third the amount of ink necessary to produce the same effect on a direct printing litho-machine with little wear on the plate as the paper comes in contact with the rubber blanket and never touches the plate.

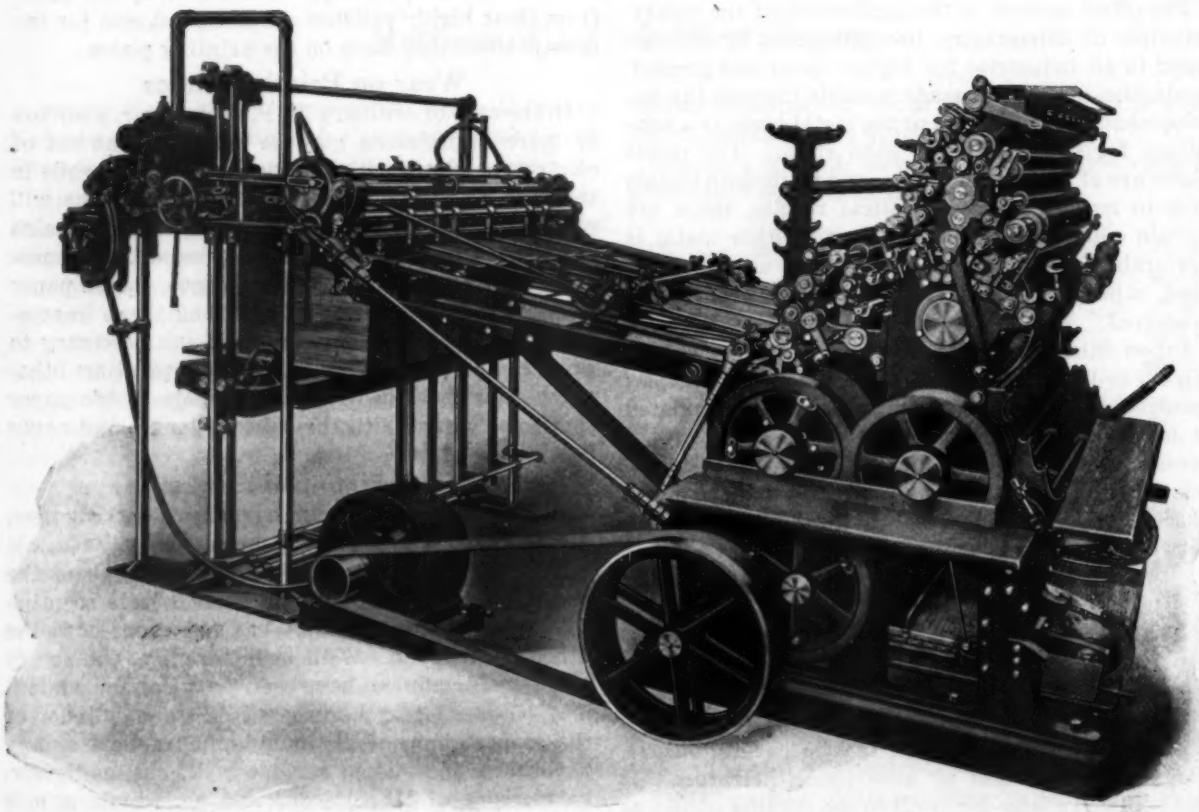
Description of Process

Rubber blanket offset lithography is nothing new, being in use for over thirty years as the only feasible process for printing tin and other metal signs on the stone lithopresses, but it would never have been developed if the metal plates had not superseded the lithographic stone. Without metal plates the rotary offset press could not have been practical, for while it may be possible to manufacture a stone cylinder of the proper diameter, it would be impractical, as any renovation of the stone surface would change the circumference of the cylinder and necessitate a new cylinder for every job.

Preparing the Plates

The preparation of the metal plate for the printing press is the most difficult and the most important part





The latest type of presses used in offset printing

of the process, and consists in imparting to the metal surface the physical properties that are naturally inherent to the litho stone. In all planographic printing where the printing image and the blank surface is all on the same plane, it is evident that while the image must have affinity for the ink, the opposite must hold true with the blank or nonprinting surface or it would be impossible to produce a clean print.

The Litho Stone

The litho stone in itself is hygroscopic and has an affinity for water, and a fine grain or texture can be given it, capable of retaining the desired percentage of damping water. This important physical property may be developed to any desired extent, being governed only by the job at hand, whether a close, shallow texture is required or a coarse, deep grain is necessary to produce the desired results.

The minute indentions retain the desired amount of damping water to act as the repellant for the greasy ink. Upon laying out the printing image on the prepared surface and applying a solution of gum-arabic, a chemical compound is formed which upon oxidation has an affinity for the greasy printing ink. The litho stone then has two contrary properties—affinity for both greasy litho ink and water.

Preparing the Metal Plates

To prepare the metal plate so it will have the same lithographic properties as the litho stone is the most important part of offset printing. To produce the texture or minute cavities in the metal that are natural to the stone a machine is constructed that will "GRAIN" the plate to any degree of fineness desired. For a close, fine texture pumice powder is used, and the use of various other abrasives such as yellow sand, emery and fine crushed quartz, a texture of any predetermined degree of fineness can be secured.

Graining

The plate is placed into the water-tight frame of the machine and the abrasive sprinkled thereon; marbles of wood, glass, earthenware or steel are then added to act as weights and exert the necessary pressure on the abrasive to produce the desired scratch or cut on the surface of the metal plate. In order to communicate a rubbing motion to the graining material the tray, which rests on ballbearings, is given a shaking motion by an eccentric.

When the graining is finished the plate is removed very carefully, washed thoroughly and dried quickly in front of an electric fan or hot-air blast. The plate is then placed into a nitric acid-alum bath for about five minutes. It is then washed very carefully with clean water until all the acid is removed, and then dried rapidly to prevent any oxidation from taking place.

Change in Physical Properties

The plate now possesses the same physical properties that make the litho stone an ideal medium for planographic printing, as it now has an affinity for water and a repulsion for grease in the presence of moisture. The plate is now ready to receive the image or drawing of the work to be printed, the technique of which consists essentially of the same methods as are used in stone lithography and is then ready for press.

The Press

The offset press consists of three cylinders, one for the printing plate, one for the rubber blanket and one for the impression cylinder to carry the sheet and effect the transfer of the printing from the rubber blanket to the paper. The paper passing between these two cylinders is subjected to printing pressure on its whole surface area. No matter what size the subject or design printed thereon, the whole surface is subjected to the same pressure, so that any slight wrinkles or waves on the gripper end of the sheet will be carried with great exaggeration throughout the entire length of the sheet. There are no margins whatever whereby any wrinkle, no matter how slight, may be taken up and overcome.

Letterpress Printing

With letter-press printing small wrinkles or inequalities in the length of the sheet can be taken up in the average form, as the impression surface is only 13 per cent of the total area, yet in the case of a heavy form containing 20 per cent or more of impression surface with some wide half-tones, considerable trouble is experienced with wrinkles. How much more important this matter is to the offset press can be realized, as the impression surface in its case is the total area of the sheet, or 100 per cent.

It is on account of this fact that the majority of paper manufacturers have had complaints in regard to their product, as it is very essential in order to prevent wrinkles that will mar the printing that the paper be free from curled edges or any tendency to curl and must lay absolutely flat.

Grease and Water

There are two sets of rollers used, one to supply the ink for the image or design on the plate, and the other set to supply the necessary amount of water to the blank section of the plate in order to repell the ink and preserve a clean print, as the whole surface of the plate is planographic, and it is upon the maintenance of an equilibrium between the grease attracting and grease repelling sections of the plate that makes the process a possibility. Water is always present, and while the greasy ink used is insoluble in water, a large amount of moisture is absorbed by the ink, so that when the rubber blanket comes in contact with the plate it receives a film of water from the

blank or matt surface of the plate and a film of an ink and water emulsion from the printing part of the plate, and transfers this film to the sheet of paper.

Printing Unsized Papers

This combination of moisture and pressure eliminates all unsized or slightly sized papers from consideration for the offset press, as when brought into close contact with damp rubber blankets, fibers and dust from the surface of the paper adhere to the blanket and are transferred to the plate, where they fill up the minute reservoirs formed by the grain. This upsets the equilibrium between the water attracting and water repellant sections of the plate, as the accumulation of fiber and dust forms a ground upon which the ink adheres and gives a dirty print, necessitating constant washing and gumming of the plate.

To prevent this action the paper or paper board should be hard sized.

Excessive Stretch

As in every other method of printing, the subject of shrink and stretch is a very important one. Should the paper be susceptible to stretch it will cause even more trouble than would a sheet with an uneven or wavy edge when the sheet entered the impression cylinders, as no paper will stretch absolutely even throughout its entire width. The stretching action would take place along the line of least resistance and cause numerous small wrinkles across the printed surface, ruining the work and materially injuring the rubber blanket if the paper being printed happens to be a heavy sheet.

Summary

The results of investigation indicate that while there are many variables entering into a sheet of paper for commercial use that cannot be controlled or overcome successfully without increasing the cost of production to a prohibitive point, there are several important qualities that are essential for the accomplishment of satisfactory results by the consumer of offset papers. These essentials can be and in some instances have already been met by the paper manufacturers without increasing the cost of production.

From this viewpoint the following recommendations will be of interest to both manufacturer and consumer:

(1) That the paper be hard sized; (a) to prevent the absorption of the ink film by the paper and enable a thin ink film to give the desired effect without having its color value lowered through being absorbed by the paper; (b) to prevent it from giving off any fibers, fluff or loading material when brought into contact under heavy pressure with a damp surface.

(2) That the paper should not be wrapped or packed for shipment with the moisture content less than air dry, but should be packed at the average temperature and humidity that prevails at its destination; to eliminate the possibilities of cockled or wavy edges thru the absorption of atmospheric moisture by the machine dry or bone dry paper.

(3) That the paper should have a minimum of stretch; (a) by the choice of paper-making fibers that are least susceptible to atmospheric changes this precaution, combined with the fact that the hard sizing will act as a protecting coating to the fibers and retard the penetration of moisture, will reduce the trouble experienced from stretch to a minimum.

(4) That the paper should have a good formation, and particular attention should be paid to the proper couching and pressing, which will tend to bring about greater uniformity of stretch throughout the sheet.

(4) (a) the antique or eggshell surface of the paper should be even and uniform, without wire or felt marks, so as to give a good clean printing surface that will not detract attention from the subject matter.

(5) That the paper be neutral and contain no free alkali, acid, bleach or alum residues that may be ionized by the damping water and attack the rubber blanket, printing plate or ink used in this process.

Any paper having the above qualifications will be suitable for the Offset process and will always give perfect results and entire satisfaction.

The Suitability of Second Cut Cotton Linters, Cotton Shavings and Hull Fibre for Paper Manufacture

(*Continued from page 270.*)

or, if desired, by combining them in any desired proportion by first passing them through a suitable duster and then blowing the mixture to the digesters and pulping the mixture under the proper conditions. By proper beater treatment high grade writing, book, blotting, tissue and other stocks can be produced.

From the experimental data we can see no reason why a high grade stock cannot be produced from second cut cotton linters, shavings and hull fiber. Whether or not the raw linters and shavings can be produced at a price to compete with wood for the manufacture of sulphite and soda pulps must be ascertained by further co-operation with the producers.

Paper and Water

By WILLIAM BOND WHEELWRIGHT

HE who buys paper buys water, for there is at least one hundred pounds of water in any well-seasoned ton of paper.

The affinity of paper for water is, from the practical point of view, one of the most important, as well as one of the most striking, properties of paper, and yet its significance seems often overlooked both by consumers and producers.

In the first place, paper cannot be made without the use of enormous volumes of water upon the purity of which depends the brightness of color and cleanliness of the product.

The cellulose fibers of which paper is made are surprisingly absorbent, as is strikingly shown by the humble but useful blotters on our desks. Each individual fiber swells in diameter as it absorbs moisture, at the same time becoming limp and plastic. A moist fiber in the process of drying behaves in the opposite manner—it shrinks, twists and becomes crisp.

These are the peculiarities which make it possible to assemble thousands of separate fibres and felt them into a sheet of paper which has been neatly but academically defined as "an aqueous deposit of cellulose."

Colloidal Suspension

The milky looking solution in the paper maker's vat is principally water in which millions of isolated fibers are held in suspension. The hand worker has but to dip his mold therein and to bring it out in a horizontal position, the passage of the water through its meshes deposits the fibres in a snow white layer on the seat of the mold. This film visibly solidifies as the water drains away, while the skilful side-to-side shake the workman gives the mold evenly intermingles the fibers. In order to remove this new sheet of paper the mold is inverted and pressed upon a moistened piece of felt. This operation peels the sheet off and leaves the mold ready for making the next sheet.

A second piece of felt is placed on top of the pulp sheet, and in turn other sheets are added to the pile, until a sufficient number have been accumulated. Next, this pile is placed in a press where as much water as possible is expelled. Even under heavy pressure the fibers retain 50 to 60 per cent of moisture, and this residue can only be removed by evaporation.

Sufficient firmness is imparted by the pressure to enable the sheet to be separated from the felt and hung up on poles to dry. This does not mean that they become bone dry; all depends upon the condition of the air itself. Even the most arid natural air would leave two or three percent of moisture in the paper, and under normal atmospheric conditions six to seven per cent moisture would be retained in natural air-dried paper. Under the artificial forced drying of modern paper machinery, the paper is often deprived of too much moisture and is therefore bound to correct this deficiency by absorbing atmospheric moisture as soon as it gains exposure to the air.

Hygroscopic Nature of Paper

The point that people are so slow to get is, that the amount of moisture paper contains is not constant, but varies like the weather.

Now, because a cellulose fiber expands while absorbing, and contracts while emitting moisture, a heap of trouble is encountered in printing close-register jobs, since the dimensions of the sheet vary accordingly.

The most that the paper maker can do to guard against this natural instability of his product is to produce it in a normal state of dryness. Since the atmospheric conditions of a pressroom may widely vary from that obtained at the mill, the printer should allow a reasonable time for acclimating the stock to his conditions, maintaining, if possible, identical conditions in his storage and pressrooms.

Ask the next paper manufacturer you meet how much moisture he leaves in his paper as it winds off on the reel of the machine. If he can give an intelligent reply he is probably doing all that can be done to dry paper scientifically. Otherwise, it is a hit-and-miss performance in his factory.

Static Electricity

Furthermore, it should be observed that there is a connection between drying methods and static electricity in paper.

The drier the paper, the greater are its insulating properties, and dry paper charged with static electricity is most tenacious of this troublous substance.

As regards the consumer's responsibility for the conditions of paper, I would venture three suggestions. Firstly, the order should be placed a reasonable time ahead of delivery requirements; secondly, the paper should be stored in proper quarters after its receipt. I recall seeing a storage room in a basement through which an open brook was running, and the trouble this customer was experiencing with his paper was just what might have been expected.

The ideal storage would reproduce atmospheric conditions identical with that prevalent in the pressroom.

Pressroom Practices

After paper has been stacked in the pressroom, the more constant the atmospheric conditions maintained, the better results will be so far as register is concerned.

The usual practice of lithographers could wisely be followed by printers on color work jobs, namely, of hanging the paper in the same atmosphere as the pressroom for one to two weeks before printing, or laying out on racks. The latter method does not give so complete exposure to the air as the former and is to this extent less effective. The complete effectiveness of either method depends upon the uniform maintenance of atmospheric conditions in the pressroom during the run. Unfortunately, few pressrooms are so constructed as to admit of any positive control over conditions.

The ideal pressroom should be perfectly insulated and the air admitted should be heated and humidified artificially to the desired condition.

The Seasoning of Paper

In conclusion let me make a few notes on the seasoning of paper.

There seems to be some mystery about this term behind which the paper apologist dodges when aught goes wrong. "The stock is too green," he says. "It is not seasoned enough."

Now, in the good old days of hand-made, nature-dried paper, it is probable that some shipments were too "green." The seasoning then consisted in a sufficiency of airing to permit the full normal evaporation.

"Green" Paper

Modern machine-made paper, I am inclined to believe, is almost never made too "green." It is much more likely to be made too dry or, in other words, not "green" enough, in which case the seasoning must consist of absorption of moisture until a normal amount is contained uniformly throughout each sheet.

In either event, a reasonable time may desirably be allowed to elapse between the making and the using of paper, but the exigencies of modern business seem often to prevent, under these circumstances, the blame for disappointments must not be placed too hastily.

Those who study and keep in mind the intimate connection between paper and water, will surely do so to their profit.

How to Make Roof Timbers Last Longer

ALTHOUGH there is scant information on the service and cost of treated roof timbers in paper mills, where high humidity causes rapid decay, a number of preservative treatments which it will undoubtedly pay to use may be suggested.

Preserving Timbers by Steeping Process

The steeping process consists merely in soaking the timber in a water solution of a preservative such as zinc chloride, sodium fluoride, or mercuric chloride. The wood must be thoroughly seasoned. It is left in the solution one day for each inch in thickness and one additional day. After treatment, the timber should be air dried before using. Specific directions for the use of this process (and they are especially necessary for handling mercuric chloride) may be secured from the Forest Products Laboratory, Madison, Wis. Zinc chloride attacks lead paints but is very desirable otherwise. Mercuric chloride is very effective but is poisonous and has a decided corrosive action on steel, so that steel tanks cannot be used with it. Sodium fluoride does not attack paint, is not corrosive, and in most other respects is very desirable.

Timbers may be coated with coal tar creosote by a brush treatment, by dipping in hot oil for five to fifteen minutes, or the hot and cold bath method. This last method consists in submerging the lumber in hot oil for several hours and then either allowing the oil to cool down slowly with the wood in it or plunging the wood into cool oil and leaving it for several hours.

Coal tar creosote is objected to by some insurance companies as a fire hazard, but whether or not it really does add greatly to the inflammability of wood is a debatable question. The odor of creosote may be objectionable in food storage rooms, but is not usually displeasing to workmen. Creosoted wood cannot be painted over successfully because the oil quickly comes through the paint and discolors it.

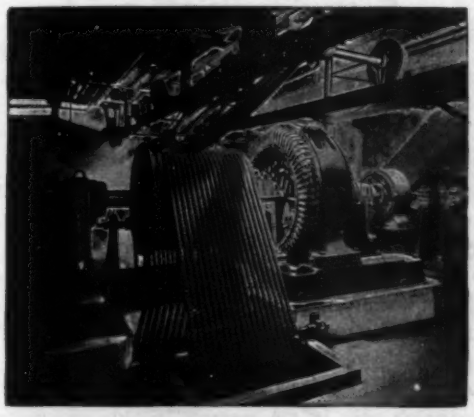
Although pressure treatments are the most expensive, they are the most effective because they result in the greatest absorption and penetration of preservative. Roof planking should receive eight to twelve pounds of creosote per cubic foot, or one-half pound of the salt if zinc chloride is used. Such treatment should add at least 20 years to the life of roof plank.

The effectiveness of treating timber depends upon maintaining a complete envelope of treated wood around the untreated interior of the piece. If this treated layer is broken through decay can enter and destroy the untreated interior in spite of the treated outer layer. For this reason lumber should be cut to final dimensions before treatment. Whenever it becomes necessary to cut into treated timber the untreated wood exposed by cutting should be given two brush coats of creosote or some other preservative.

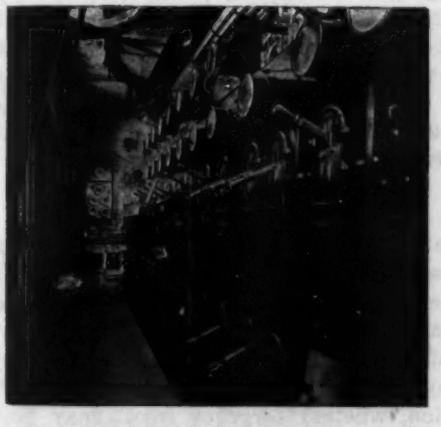
A Flexible Power System at the John Lang Paper Co.

By F. B. DAVIS

THE John Lang Paper Company, of Philadelphia, which is a large manufacturer of roofing saturating and deadening felt, has developed a very flexible system of power generation and distribution.



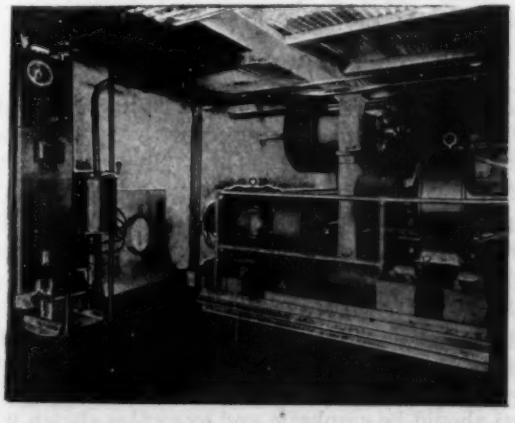
Rope driven Westinghouse 450 KVA, 550 volt, 3 phase, 60 cycle A. C. generator for paper mill



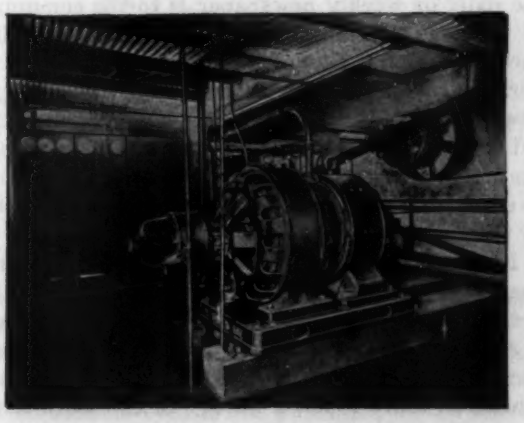
Panel Switchboard installed by Westinghouse Electric Manufacturing Company

There are four independent manufacturing units in this mill, each complete in itself from rag cutter to paper machine. Each paper or board machine is electrically driven and normally each is supplied with power from its own alternating current generator. All the generators and paper machine motor circuits are, however controlled from a single switchboard, so that it is possible in case of trouble to operate any given paper machine with power from any of the generators, so that the chances of a complete shutdown are very remote. The generators range in size from 200 to 450 KVA.

Another interesting feature of the power arrangement is the use of a fifth generator of 300 KVA, which is controlled from a separate section of the switchboard, and is intended to be used on Sundays and holidays only. If desired, all of the rest of the switchboard panels can be "deadened" for inspection, repairs, etc., while the small generator operates the lights and provides enough power to make repairs.



Westinghouse 75 H. P. wound rotor induction motor driving constant speed line shaft at left and 75 H. P., 275-1150 R. P. M., D. C. motor driving variable speed end of 124-inch Moore & White paper machine on right



Westinghouse 90 H. P., 550 volt, 60 cycle synchronous motor driving D. C. generator for supplying power to 75 H. P. adjustable speed motor. Control panel for machine in background

Three of the paper machines are driven by constant speed alternating current motors of from 75 to 100 HP., speed control of the variable speed end being

(*Continued on Page* 309)

The House Organ

By FRANK L. BRANDENBERG

CONSTANT changing of working conditions and business methods during the past few years have brought a new factor into the latest order of things—namely: the house organ—and now there are few employers of labor of any consequence but have a regular monthly bulletin, magazine or house organ of some kind devoted to their peculiar needs.

Judging from the large number of these publications that have come under our observation, there is a vast divergency of opinion among the publishers as to the proper method of conducting same. Each and every one we have seen possesses an individuality, but many are without real merit and do not fulfill the purpose for which a house organ is intended.

The Functions of a Shop Paper

The house organ can be of infinite good or otherwise, according to the policy of its publishers and the manner in which it is printed. By some it is looked upon as one of the essentials necessary to the promotion of co-operative measures between employer and employe—the medium by which every one in an institution, whether large or small, may familiarize himself with the work in which he is engaged, and by which, no matter how mediocre his position, he can and should be made to feel he is a part.

To be successful, the house organ or shop paper should be to the employe and employer alike what the daily or weekly newspaper is to the community in which it is published. It should be the medium through which events of interest to the workers are heralded. There is no better means of conveying new methods, issuing bulletins, acquainting new and old employes with facts and practices than through the columns of the house organ, but the same should be edited and written so as to be as readily understood by the porter as by the superintendent.

People, as a rule, do not care to spend much of their own time delving into statistics, which at best are generally cold, uninviting and uninteresting reading. Give them something worth while reading—something having a local color. If one has a bent for statistics, there is not a library in existence that is not easily accessible to the seeker after such knowledge.

Composition and Style

Particular attention should be paid to the general appearance of the publication as regards style of make-up, illustrations, type faces for the body matter, with a harmonious letter for the headings. The stock should also be selected with a view of obtaining the best printing results. Too little attention is given to the printing of most house organs, and these bear evidence of emanating from the so-called work rooms of the Clover Center Clarion or Hickeyville Herald. There is a good printer in every community capable of producing creditable work; his price may be a trifle higher than the incompetent one, but it will be economy to have him do your work.

Suggestions for Material

A few suggestions as to the items and articles found to be of most interest to readers of such organs and the methods of obtaining same might not be amiss to those who are striving without success to make their paper interesting.

The most interesting news to the workers are the items that are written about themselves by one of their number. A good plan for compiling such items is to divide your establishment into several departments and then appoint a correspondent in each department to represent it. The person selected need not possess any literary ability so long as he has a "nose for news" and is able to recognize news when he hears or sees it. A person of this character will be more valuable than one capable of writing a brilliant story, but who is never able to see anything that would justify the use of his wonderful talents. Correspondents should be interviewed frequently, their material collected and articles written from the leads furnished by the correspondents or representatives.

Departmental Representation

All departments should have a distinctive heading, attractively drawn or lettered, with the correspondent's name immediately below. Reporters may be changed with each issue, thus giving every one in the department an opportunity to show their aptitude for the work and prevent the burden from falling on any one individual.

Safety First articles are always of interest, especially so if accompanied by illustrations showing means of preventing a repetition of an accident, or preventive measures of avoiding accidents. Warnings should be emphatic and examples shown where possible.

If your organization has a sick or benefit association, an occasional report of its condition is sure to be of interest to all concerned.

Foreign Language Articles

For foreign-born employes who cannot read English, occasional notices printed in their own language has been quite effective where there has been a suffi-

cient number of employes to warrant it. However, every effort should be made to educate such employes in our own language and persuasive measures used to compel them to at least learn to read and write the English language. Classes can be easily arranged with little expense.

Educational Articles of General Interest

Feature articles are not always easily obtainable, but a history of the industry, run serially, beginning with its inception and brought down to the present day, will prove ideal material. These articles should explain minutely the work in all departments, thus giving all workers details of the labor in which they are engaged and of which they are unfamiliar outside their own department, having little or no opportunity to see the work performed nor the importance of their individual efforts upon the finished product. These articles may be elaborated upon and show the finished product delivered to the ultimate consumer.

Articles showing the production of all raw materials entering into the finished product are bound to be read with interest, and will prove a source from which you will never be at a loss to find material with which to fill your pages.

Questions on all articles should be invited and answered in detail. No one would ask a question so simple that it could be answered with a monosyllable.

The staff of each house organ should have an associate editor to write up the suggestions of department correspondents who are unable to write themselves. Executives should be prevailed upon to furnish an article for each issue, and the meetings of the Safety First and other committees should be held on such dates as to insure the publication of the minutes of the meetings or the most important parts thereof in the following issue.

SPANISH RIVER NEWS
PUBLISHED BY THE NORTHERN PAPER MILLS GREEN BAY, WISCONSIN.
APRIL, 1919.
MARATHON SAFETY BULLETIN
THE RARIPACO
THE RACQUETTE RIVER PAPER COMPANY
WRAPPING PAPER
VOL. III POTSDAM, N. Y., JUNE, 1919 NO. 3

History and Civics

A column devoted to the personnel of the federal government, a historical resume of the state, county, town or village will prove instructive to many readers.

In an advertising sense, the house organ has superseded the regular small-sized catalogues and price lists in many instances, but a publication for the promotion of fellowship and co-operative methods between the workers and employers should be entirely free of all advertising and devoted exclusively to the purpose for which a house organ is intended.

The Paper Mill Supply Business

By G. H. GREGORY

"A PACKING plant for paper mill supplies costing over a third of a million dollars—what do you know about that, brother?" Yes, a plant designed, built and equipped especially for handling paper mill supplies is some contrast to the early beginnings of the business, "before the war." Premises were used in the early days for the collection, storage and sorting of waste only when no other use on earth could be found for them. Metals were also collected and the outlying, tumble-down building, waiting to give place to something better, with its surrounding lot, became the home of waste, the old iron going to the surrounding lot where chance of theft was small, considering the uninviting appearance of what was there to be stolen, and the non-ferrous metals, rags and waste paper going into the building where the fire risk was about as bad as it could be and the sanitary conditions were fearful.

Although there is a form of structure which particularly lends itself to the efficient and economical handling of paper mill supplies (and much attention will be given to this later in these articles), particularly as to height of buildings, light and other features, no attention was paid to all these aids to success in those days. A cheap rent was the main thing, and no questions asked about even the railroad switch which is an indispensable thing now-a-days. A cheap cellar looked good to them, and to this day the collectors of waste paper, rags, etc., in the East, particularly in New York City, are called "cellarmen." The growing and ever growing scarcity of the wood for ground and chemical fibres helped and the war helped a lot more, and the business is now finding itself.

We Americans don't know the meaning of that word waste, but the war has taught us something and we have a whole lot more to learn. A worker in the Red Cross recently returned to New York. This woman is credited with having been in the front line trenches more than any woman in the world—such terrible experiences has she gone through, that her friends, on being struck with the peculiar expression of her eyes, exclaimed, "Why, Mrs. Blank, you have just the same look in your eyes as the boys who have gone over the top and are suffering from shell shock." Upon being further asked what, in brief, were her outstanding impressions after all that she had seen on the other side, she answered, "The value of human life and *waste*."

The business of caring for waste has grown enormously, is just as respectable as any other business, and is here to stay. We plant ourselves squarely on that platform. But the business is different from most other businesses; in fact, it might be said to be the reverse or return trip of business. Why? Because, while almost every other business you can think of is a distributive business, this is a collective business. One fact will be significant in this difference. In all other businesses the man who buys the goods of that line is called a "customer," but, espe-

cially during the five years of the Great War, the habit has been forming somewhat in the waste trade of calling the men from whom the waste dealers buy their stuff "customers."

The armistice brought in tremendous changes; it was the signal of greater changes than we knew, but in this business, tumbling prices and a total stopping of orders gave a wrench to the minds of many waste dealers. They had gotten into the thought that their big job was to find the stuff; "damn the demand; that will take care of itself." *Well, it didn't.* They are now beginning to realize that the real "customer" has got to be hunted, and he is a tough customer to find, and *he is the man who will buy our stuff.* The old scriptural saying " 'tis naught, 'tis naught, says the buyer," holds good today as it has for thousands of years. One old paper stock dealer, who was wise enough to know that the war time was the abnormal time, and that the time before the war and NOW is the normal condition, said, "The war was a dream; we are now waking up." It had been a beautiful dream to him because he had been wise enough to know that "seller hunting" would soon cease and "buyer hunting" in real, deadly earnest would soon begin again, *and this same sense had made him a fortune,* while the dream proved a nightmare to many others.

We are already beginning to look back with a smile at the fears which immediately succeeded the armistice. Many who had been badly caught said dolefully that the jig was up, that only the funeral of the business remained to be conducted with all the decorum that the fearful state of business permitted. When the situation was at its worst the writer of this article had a full page review of the market conditions and the future of the business. This, in substance, was what was given for the enlightenment and encouragement of the business and to contribute to the confidence in its future, necessary to keep it alive, as follows:

Collection of waste had been fearfully stimulated. Beginning with the Government and working down, Secretary of the Interior Redfield had issued a pamphlet urging the saving and sorting of waste paper by everybody. This pamphlet gave detailed instructions as to the grading and packing of waste paper. Cuts a plenty for every detail of a baling press were given, which could be made at home at slight expense, the whole thing being almost altogether of wood. This was the time that the Red Cross got into the game and the philanthropic side of the public was appealed to to save waste paper. A system of paying for the paper by coupons issued by the Red Cross was put in use and collectors were furnished with a badge showing their authority to collect for the organization. These coupons they bought from the Red Cross and paid out to the housewives, and current market quotations were daily given in the papers so that the right price might be demanded from peddlers. The boy scouts and even the girl scouts were enlisted in the cause and all the clean-up organizations and the city beautiful organizations were set to work, with the result that every cellar, every attic, every wood shed and every old barn in the country was scoured clean of waste material. Of course the signing of the armistice was the signal for the price to drop, say for mixed paper from about thirty dollars a ton, at the highest, to about five dollars a ton at the lowest, but this was not because there was such a glut of waste material in the country, but because the demand at one blow was shot to pieces and fell to almost nothing. The writer of this article predicted that when the mills came into the market again they would find that there was no huge stock on hand, and prices, while never again going to war prices, would begin to stiffen. This was exactly what occurred. Prices have not gone up so much, but still they have gone up enough to insure that collections will continue. The main difference is in the volume of business, which has now reached such dimensions as to make certain that the predictions that the habit of saving waste paper was done for and the business had been a mere wartime flurry were wrong. The conservation of waste is one of the changes in the world that has been left to us as a legacy of the war, and is an advantage that to some degree will offset the losses of that terrible struggle.

As stated in the first of this article, plans are being laid for structures for receiving, sorting, grading, storing waste paper, that are to be special to those purposes. Men are now beginning to look around to see how the business can be more economically conducted. For instance in some of the large eastern cities there were few or no warehouses in which large stocks could be carried, and this affected the entire organization of the business. The mills placed their orders for carload lots with dealers who properly should be called brokers, and when these men received an order for a quantity of a certain kind of grade of paper stock they skurried around among the smaller collectors, in many cases "cellarmen," and gathered up the necessary quantity. The dock or railroad station was the only warehouse these men had to assemble their shipments.

The armistice was celebrated all over the country by the public in throwing tons and tons of waste paper in the air, until for hundreds of feet the air was filled with a bright, gleaming, glittering confetti of waste paper. This marked an event in the new order of what is to be a big business, the conservation of paper stock: it might be said to be the coming off the ground, out of the cellars if you will, of the humble caterpillar and the evolution into the bright butterfly, gay in color and sparkle in full radiance in the sunshine, hereafter to soar with the flying machine. The people recklessly wasted waste paper in an event which really had much to do with starting and keep-

ing going ever afterwards its conservation, along economic and scientifically efficient lines.

A large factor in this new economy is to be the paper stock house. Many articles might be written dealing with the details of the conservation of paper stock alone. What would be said in the days of the rickety, weak, small old wagon drawn by the old, spavied, worn-out horse of the "rag peddler," if we could have seen the motor truck, such as is given in the picture in this article. No less changes are taking place all down the line, from the collecting of the material until it reaches the door of the mill, and it is our purpose to discuss these in detail, but at present we will but enumerate some of these points for discussion of the "best way," giving only a very brief outline in each case of the questions that will arise when you begin to look into the most efficient way of conducting this business, and a mere reading over of these topics for discussion will lead you to say to yourself, "Well, I never realized there was so much in that rag picker's business." Forget the caterpillar and just take a little trip with the butterfly.

Now that we have decided that the business is really worth while, let us again remind the reader that it differs from other business, and he must keep this difference in mind while considering its details; that it is the reverse of ordinary business, and in nothing is this difference seen more than in prices. In all ordinary business a large quantity of any commodity sells at a LESS price than a small quantity. The principle of wholesale rates is of such universal application that a story is told of the notorious Wall Street operator, Jim Fisk, that he was once approached by a man, when Fisk was still very poor and not yet successful, with a scheme whereby they could make a dollar each, but its successful carrying out involved the necessity of each of them telling a lie. Jim Fisk threw himself back and said he wouldn't do it. "What, tell a lie for a dollar. Never! But—" and he leaned forward to say this in an undertone to his partner, and spoke with great earnestness—"I will any day tell a dozen lies for ten dollars." Wholesale rates, you see.

Now the very opposite of this prevails in all the waste trade. The man with a push cart load of waste paper has nothing, the price is next to nothing, and he can hardly get an offer. If he has enough to make a thousand-pound bale he may be worth looking at, and if he has a carload, "Why, come in and let's talk it over." The business is like the gathering of the water in the drainage of land. It all starts in a little rill of water, then a little ditch, then a brooklet, then a stream which flows into a small river, and this into a larger river, until the ocean is reached. This, it must be confessed, has resulted in the waste passing through many hands, with an increase in price as the volume grows. In this process the material gets separated into classes of material. The small man at the beginning collects everything—waste paper, rags, old iron, copper, brass, rubber, anything he can lay hands on. Specialization commences and the big dealers handle only one thing.

The above being the case, in naming only a few of the topics for discussion, we will go to the source, to the humble beginnings of supplies,—the

Collection of Waste

Much might be said about waste in the hands of the householder, the printer, the boxmaker, the office building, etc., and opinions differing along the line of whether the seller of waste should be encouraged to have small hand balers, whether the subsequent trouble of shaking out for sorting at the plant does not offset the advantage in hauling, etc., but we shall leave these details for future discussion. There is one point we do want to speak of briefly, however, and that is the employment of modern methods for collection. Take a look at the truck illustrated in this article. We believe in the open side truck, which may have side stakes and be converted into a box body at will. In the shape our picture shows it, how handy it is for loading or unloading at either side or the back!

But you may say that is all right for handling paper stock in bales, but the horse and wagon and even the push cart will remain for collecting. They will. But let us tell you of our experience with one enterprising collector who used a light Ford. This man used all four inflated tires and ran around with the speed of a pleasure vehicle. How about tires? Yes, he used up a lot of them. He came back to his place heavily loaded sometimes, very heavily loaded for inflated tires. But, listen. His place was in a neighborhood that contained the places of many other collectors, who, from lack of means, or for whatever reason, did not have trucks. This man would get an early start in the day, about sunrise even in summer. He would make long runs out to sellers of waste who were seldom visited. He was always sure of his load and at the right price to make a profit. As he was on inflated tires, he reached these outlying points early in the day, and was loaded and on his way back early enough to meet the hungry crowd, near his own place, of dealers who took, one this, the other that, of his load. He had time to make the right kind of deals, and didn't take just any price they might offer, and the buyers knew that they did not have facilities to get what they needed to fill orders, and felt that they had better give him a fair price. By night he had much of his load resold and a good profit in cash in his pocket. That part which he had not sold he took to his own place just as the ordinary wagon and push cart collector would have to do with his whole load. There is much to be said in favor of modern methods, even in the matter of collections, but we won't say it now. Let us follow the collection to the packing plant. A book could be written about the designing, building and equipping

of an ideal packing plant. What is an ideal plant? In the first place, how high, how many stories should it be? Are you in favor of the three-story type, which in truth does seem well adapted to an organization of a packing system. Do you think there ought to be a basement or would you set the ground floor balers in solid concrete? The altitude of that ground floor, say, that is a most important point. Should the level of the railroad car floor and first floor be the same, etc. We will not pretend to enumerate even a small part of the questions that will arise in an adequate consideration of this subject, which could not be properly presented without the illustrations of floor plans, routing plans for stock, etc. Remember, we are talking about a plant built for just this business, not some old tumble-down shed rented cheap and an eyesore to the whole surrounding neighbors, who would view a fire there with joy.

The exact relative positions of sidetrack, elevators, balers and scales will give you something to think about, and a good plan or a bad plan will be reflected in the profit and loss account at the end of the year. Let us pass to a word or two about

Sorting and Grading

Now let us say right here we do not believe in sweat shop methods. The health of employes should be the very FIRST consideration and not left to the tender mercies of some men in their hungry hunt for money-making methods. But there is a good way and a bad way about doing everything, and if these men who have made a life pursuit of MOTION STUDY have something to offer along this line, why not at least hear what they have to say? Taylor is the father of the whole subject and is undoubtedly credited with wonderful results in such mechanical motions as shoveling coal, making labor much more effective. Gilbreth tells of equally remarkable results in laying brick. The sorting and grading of paper stock is too important a factor in the business to ignore any possible improvement as great as this might be. But we will not go into details now, but pass on to

Fire Prevention

In the Insurance Building in Chicago, which, of course, is the storm center of all matters of fire insurance in the city, there is a library as large, containing as many volumes as in the public library of a city of ten thousand people, and everything in this library has some bearing on FIRE. Now, it could hardly be expected that anything less than one whole article devoted to this one subject alone would be adequate treatment; so we will pass on to

Sanitation

by which we not only mean sanitation in its ordinary sense, but the care of health against diseases peculiar to rag and paper stock. For instance, do you believe in wearing a mask in such a situation? We know of one case, and he is the head of the firm, who has been sick in hospital for some months with a prospect of some months more ahead, who now most thoroughly believes in such a preventative and has not waited to get back to his place in having masks introduced.

Where Should a Paper Mill Supply Plant Be Located?

As Mutt says to Jeff: "Now you have said a whole mouthful." We are not now going to the very large survey of the relative merits of East and West for big centers of the business, although a Chicago man might call your attention to the fact that the business, being a collective proposition, deals with the whole population of the nation as much as a distributing business does, and that therefore it is as logical to say that the greatest development will take place near the center of population in the one case as the other.

It must be kept in mind that paper stock is a weighty material in proportion to value, and that therefore charges for carriage will always be a big factor in the business, while the question of storage is of tremendous importance. For instance, a man might, having carefully in mind the nature of the material, make ample provision in a warehouse for tiering the bales of paper stock with a tiering machine, but forget that you cannot tier bales of paper on an elevator and install elevators entirely too small for his needs, and thus negative the value of all upper stories.

In this matter of location, as the business grows and this matter of transportation grows in importance with it, will not *water haul* also come into the discussion. A transaction has recently been made in Chicago which is an eye opener. A paper stock house has acquired ten acres right in Chicago abutting on one of the slips of the drainage canal, so-called (really transportation canal), and this is within a few blocks of the place from which a steamer started a few days ago with a load of meat for Europe direct. With railroad and water connection with the whole world right on their premises, and ample capital to make the utmost use of them, may not these men dream dreams of the future possibilities of the business? If you think this is too dreamy, let me close this article with the following facts. The paper mill men of the country have fraternized with the waste trade, the source of much of their raw material,—how much, what percentage, cannot just at present be given. When they hold their great annual convention in New York, the waste material men meet at the same time and many of the mill men grace the banquet of the waste men with their presence. That is entirely due to the activities, the enterprise, the hard work and the waste material men of the country, have rendered the service of the paper manufacturers.

Making Paper Makers

By C. C. MASON

NOT to emulate that ambitious History of New York City which began with the history of the world, it nevertheless seems logical to first treat of what has been done in this article, very briefly reviewing vocational education's history and telling what it is, and in subsequent articles setting forth what we think ought to be done.

Glancing over all education everywhere and at all times, two radical modern departures stand out prominently from the mass, two great changes which have come upon us in the two factors which make up the whole subject, i. e., methods and matter, by which of course we mean methods of teaching and matter taught. In the first we shall give but scant attention to all the various methods, such as night schools, extension schools, shop schools, Chautauqua schools, social settlement classes, etc., etc., almost without number, but before going on to the more important questions of matters taught, we will speak of this radical departure in methed called Correspondence Instructions.

All instruction can be analyzed into three factors: First, the printed or written part, such as text books, answers to questions written out by the student and corrected by the student; second, the teacher, and third, the material, machine, model or thing being studied. Of course the third factor or element is non-existent in cultural or abstract studies, but we are now speaking of the teaching necessary to make good, practical, expert paper makers. Now our criticism of Correspondence Instruction is that only the first element can be with the student. We realize that the correspondence method had a tremendous vogue for a time and we cheerfully admit that for some subjects it is adequate, but not for paper making. The text book, or the printed instruction pamphlet sent to the student by the correspondence school, is the same as in any other form of instruction and his written exercise can be sent thousands of miles by mail and the teacher's corrections sent back again. But can any one claim that this is the equivalent of the presence of the teacher, that vital, driving force which gives energy and enthusiasm to the student, and keeps him to his task? In school do all things go on as well when the teacher is absent? In the case of young people would they go on at all? Of course we understand that correspondence instruction is primarily intended for the man who has come to see the necessity of application, but as "time-keeper" alone, if he is good for nothing else, a teacher will bring better results by being "on the job."

In the case of vocational, industrial or technical training, the presence of the teacher, directing the student's attention to the material, machine or model seems indispensable to secure results. In teaching writing or composition, whether advertisement writing or business correspondence, the thing sent in to the teacher is the thing worked upon by the student, and is entirely adequate, and there are many, many subjects that can be very efficiently taught that way; they have been taught and will be taught that way, but we do not think that paper making pupils by correspondence will ever give employers the satisfaction that would result from paper making schools in paper making centers, with practical instruction upon the actual material and machines and with a good teacher present.

That "teacher" question is a very large one. General Garfield said that a very simple university would satisfy him, just a log with Mark Hopkins sittting on one end and Garfield, the pupil, sitting beside him. But a short horse is soon curried and we will pass on to matters taught: What we have referred to before as the outstanding department in what is taught in the modern development of eduaction, is the greater attention now being given to those subjects which fit the pupil for earning a living, vocational training, and less of the cultured subjects. But the thing did not come at one bound. In fact Vocational Training, which looms so large before our eyes now, has on one hand a thing which preceded it and which is now somewhat discredited, and on the other hand a thing which is now becoming the fad of the day. By the first, I mean manual training, which years ago was enthusiastically hailed as the panacea for all our ills, political and social. It was to do away with all vexatious questions about earning a living, do away with class distinctions and we were all to be happy ever afterwards. But this having all the girls cut up paper into dolls patterns, geometrical designs, and the boys make bread boards, rolling pins and bootjacks is not so popular with educators. Many are criticising this teaching of subjects which will not be used in after life as severely as they once criticised the classics.

The other thing which has taken the popular eye at present is Vocational Guidance, and nearly all the steady stream of books, mostly from teachers, which gauge the interest for the hour in any subject, are upon vocational guidance, which sufficiently indicates its meaning.

To make a brief survey of Europe first. In England industrial training began, or to speak more precisely, tried to begin as early as 1815, but was unsuccessful because the rudiments of education had not been given to the people and they were not intelligent enough to make industrial instruction a

success. But a big wave of democracy swept over the country in 1867 and the aristocracy were forced into one of their very reluctant concessions and provision for popular education was made in 1870. The Educational Act of 1902 has put the whole matter on a new footing, and while the aristocracy has kept Eton and Rugby free from the taint, as they see it, of democratic reform, other institutions pay much more attention to the more practical things.

The Chicago Commercial Club some years ago engaged an ex-superintendent of Chicago Public Schools, Mr. E. G. Cooley, to go to Europe for a year and report upon the condition of vocational education. While we are speaking of Great Britain it may be noticed that to Scotland Mr. Cooley gives the second place, next after Germany, as the European country which had made the most of vocational training, and where it has been to a considerable extent made compulsory upon both authorities and parents.

In different parts of the world the fee system, when adopted, has been based upon the rule of the fee being returned at the end of the year as an inducement for regular attendance; attendance on 75 to 95 per cent of the session insures the return of the fee.

Mr. Cooley made a very interesting report in two volumes, the first volume being at least twice the size of the second volume, and it is most significant of what is coming to us in the reconstruction period that Mr. Cooley's first volume is all about Germany, while all other countries are huddled into the second or smaller volume.

There can be no denying that Germany is the home of vocational preparation for the struggle of life. They divide their schools into three classes: Higher, Middle and Lower. To give a slight idea of the diversity of subjects, below are given just a few of the subjects of the middle grade: Agriculture, Art Industries, Building and Engineering Trades, Ceramic Industries, Commerce, Forestry, Metal Industries, Mining and Metal (Prussia), Naval Architecture and Engineering, Navigation, Ship Engineering, Textile Industries, Wood Working Industries.

Here is a fact about this whole matter in Germany that every American should get in its full length, breadth and thickness. There is no one set curriculum for the voactional schools of Germany. They think of vocational training as a part of industry and for that reason it is not under the Minister of Education in the Government. They think that vocational training in any one place ought to be part of the industry of that place and the curriculum be made to fit the industries of that place.

Just here let us digress a little. At the late convention of the Cost Keeping Association of the Pulp and Paper Industry, the very practical superintendent of the Tarentum Mills, Mr. Long, gave a very interesting talk, and to illustrate it he had a map of the United States of his own making, indicating every paper and pulp mill in the country by a black spot on the map. Of course New England was all pretty well spotted, and Eastern New York, Western New York, the Miami Valley in Ohio, the Kalamazoo District and the Wisconsin District had many spots like a great swarm of bees. Now what do you think the Europeans, especially the Germans, would be doing in each one of those swarms of bees? Don't you absolutely know that they would have a paper making school in each one of those swarms? Or better than that even, they would have a school right in the mills of those places, teaching paper making right at the machines which were turning out paper for the market. No make believe or play about it, but getting right down to brass tacks in a real, actual mill that is the ideal arrangement. To illustrate this point further by another reference to what Germany has done. Everybody has heard of Essen. If in the mind of any person the mention of Essen does not recall industry, that person is not of this world, he belongs in some other sphere. Well, in Essen the government has no vocational schools at all. All Essen is one vocational school, whose curriculum is foundry and machine practices. That is the way Germany links up industry and industrial preparation.

Do you say this is lauding Germany? It is not. It is only telling the plain truth about a competition that will be fierce and that we have got to meet.

Driven by war necessity, Germany has been made to learn how to make thousands of things out of paper which you never heard of. They make everything a man, woman or child puts on, out of paper. They make even the harness strong enough to haul the big field guns out of paper reinforced with steel wires. A book could be written on this marvelous development alone, and you in the paper business ought to be glad of it, for it means that the paper business can be made to expand everywhere in the world.

Do you expect to meet this condition, this top notch of efficiency in the paper industry by instruction that uses but one of the three essential factors or elements of instruction? Don't you see that you must carry the paper making school right into the mill? Will any printed and typewritten substitute do the business? There is but one answer.

In New York City there are only one-fourth as many people taking vocational training, in proportion to population, as in Munich, where they will establish a course of training fitted to the special needs of any apprentices in any line of work, as soon as their number reaches twenty-five. The number of trades taught there is fifty-two, and being increased all the time. The vocational schools of Wurtemburg are credited with being the best in the world, and Karlsruhe is said to have the best train-

ing school for teachers of vocational schools in the world.

In France, Napoleon set education on its feet in the establishment of the University of France, and it survived his overthrow; one example of the good work of a man living after him. Guizot thought the safety of the state depended upon a wealthy middle class and founded schools accordingly. In the opinion of the writer one of the most attractive figures in the education of France was Viollet Le Duc, who is readily thought of as a great architect and restorer of Notre Dame Cathedral, but he was much more than that. He was one of the foremost to see that the very commercial life of France rested upon her pre-eminence in matters of art and design. Just before he died he wrote a book summing up his life experience in this matter of instruction, which was published after his death. It is somewhat of a narrative, but is mainly an exposition of the great importance of vocational skill to France; which I think is one of the most remarkable books ever written for the guidance of youth.

In the United States it will suffice in the space of this article to mention the United States Commission of Labor Reports on Foreign Conditions, the National Association of Industrial Education, Boston's Printing and Book Binding School, Columbus schools and a number of schools at Indianapolis, the typothetaeal organization schools. A few industrial firms like R. R. Donnelly and the Inland Printer give vocational instruction. The pressmen's union have a school in Tennessee. In the matter of cost finding the Ben Franklin clubs have done a wonderful work.

Journalism is taught in a number of colleges in the country. Columbia in New York City, Wisconsin University at Madison have printing in connection with journalism, etc.

There is one kind of practical instruction in Europe about which we Americans know little, that is by models. Model making, the way it is practiced in Europe, is unknown to us; it is not so much a lost art with us, it has never been found. There is a paper in London, the Model Engineer, which is indicative of this fact. This is a journal for those interested in model making. When England had become dissatisfied with her standing among the nations in technical matters she founded South Kensington, which has connected with it perhaps the most marvelous model museum in the world; the one in Paris is large, but I think the one at South Kensington larger, as their art school is the largest in the world. The vocational students can move around and study minutely the whole mechanical world in miniature in these models.

In the matter of text books America is woefully behind in paper making. All of the books upon the subject are published in England. Of course in a sense the trade papers are the text books of each trade and they are the up-to-date dispensers of information, without which some trades, notably the paper industry, would be without printed information, but we do not pretend that even The Paper Industry does away entirely with the necessity of schools.

If the mills are closed to every one desirous of studying paper manufacture, I know of but one place in the country where he can study paper in different forms in the course of its manufacture, and that is in the Field Museum of Natural History in Jackson Park in Chicago.

In this matter I think we could all take a lesson from the life of a Negro, Booker T. Washington. Before he had founded Tuskegee Institute this man found all his race with their faces resolutely turned away from the practical pursuits of life—they all wanted book learning. Booker Washington set about building up that institution literally by the hands of its students, and the brick buildings had their brick laid, and every part of their construction done by the students. This was teaching them the trades in a practical way and it won out.

In concluding this part of the subject, I wish to relate what one man did at one time to make paper making popular with the public. This man is one of the prominent world figures now on the war stage—Lord Northcliffe, the British publisher. About sixteen years ago there was a big exhibition in London at Shepherd's Bush, and of course Northcliffe had a building most conspicuously located in the very center of the grounds and exclusively for his publications. In the center of this building was the smallest Fourdrinier machine the writer has ever seen, about eight feet long and making a reel of paper about five inches wide. Everything was complete from stuff chest to winding reel, and the whole thing was most interesting.

At the same time one of the first moving picture shows given in London had as a large part of its program the reel which showed the Northcliffe mills in Newfoundland. This reel pictured the manufacture of paper from the cutting of the wood in the forest until the reel was shipped for England to go into the Daily Mail.

3% Fuel Saved by Scientific Feed Water Regulation

HERE are some interesting "before and after" feed water temperature charts that were sent to us by the Copes Boiler Feed Regulator.

Fig. 1 shows how the feed water temperature fluctuated before a regulator was installed. The average temperature by actual measurement and computation was only 177° F.

Fig. 2 shows a vast improvement. There is practically no fluctuation in the temperature now that the regulator has been installed and it is maintained uniformly high, the average temperature being 210° F. A correction in this instance had to be made on account of the recorder reading 12° high.

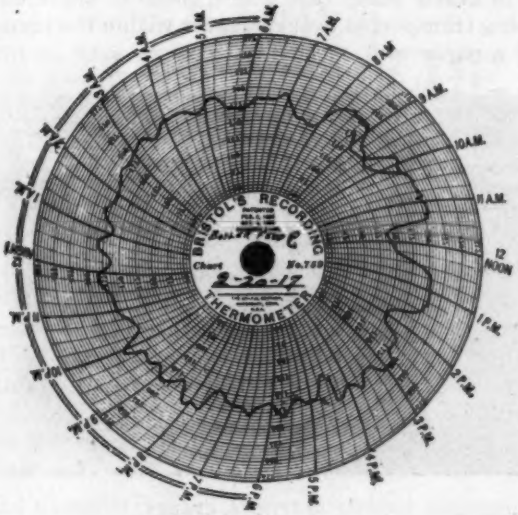


Fig. 1

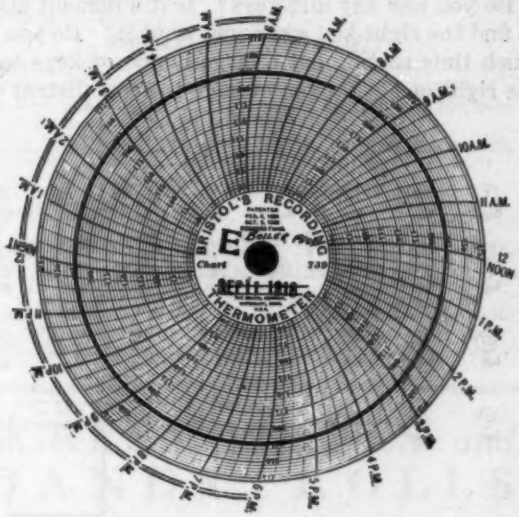


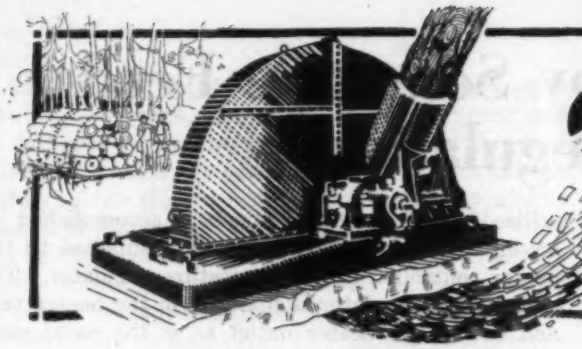
Fig. 2

The average increase in feed water temperature due to the regulator is therefore (210 — 177) = 33° F. Since it is customarily reckoned that 11° difference in feed water temperature is sufficient to save 1 per cent of the fuel, it is easy to figure that the Copes Regulators in this installation are saving 3 per cent of the annual fuel cost.

No steam escapes from the heater now that the regulator is installed. Before installation, steam constantly escaped, because with improper regulation the full amount of heat in the exhaust was not utilized. This saving of steam is accomplished by having part of the exhaust steam supplied to the heater controlled by a temperature regulator. The bulb of this regulator is installed in the heater vent and not in the heater outlet as is the usual case. With this arrangement, when any steam begins escaping through the heater vent, the steam supply valve closes quickly.

It has been calculated on the above 3 per cent basis that these regulators pay for themselves every fifteen days, due alone to this saving.

In addition it is pointed out by the manufacturers that with scientific regulation there is an increase in boiler efficiency, an increase in boiler capacity, a saving in wear and tear on pumps, and after relieving the water tender of this undesirable mechanical duty he can be given more pay in an occupation around the plant that requires brain power rather than mere muscle. The modern tendency is toward complete automatic operation everywhere, with human beings serving in a supervisory capacity only. "Machinery, machinery and more machinery" has made the 8 hour day possible and may eventually reduce it to 6 hours, 4 hours and even less.

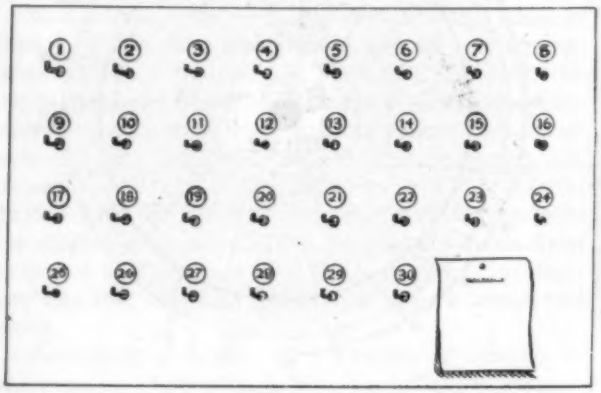


Chips of Information

PRESENTED FOR YOUR SCREENING

Key Insurance

Do you lose any mill keys? Is it a difficult matter to find the right key when you want it? Do you lose much time sorting out a large bunch of keys to get the right one? Do you ever go to some distant part



of the mill for some equipment and discover you have the wrong key? Do you take the whole bunch of keys with you to insure that you have the right one with the result that the last key you try is always the one that opens the lock?

If you do any of these things you will be interested in this drawing of a numbered keyboard with an index to the uses of each key.

A key rack of this description will dispense with lost or misplaced keys and will save large amount of valuable time.

Reworking Old Belting

Instead of discarding old belting because it is filled with oil, gummed, stiffened or skuffed up, many concerns are working them over.

Oil-soaked belts are immersed in gasoline, which soaks the oil out of the fiber. A good scraping to clean off the grease and the open joints are ready to be glued up again. Skuffed belts may be trimmed down to a narrower size if the edge is badly worn.

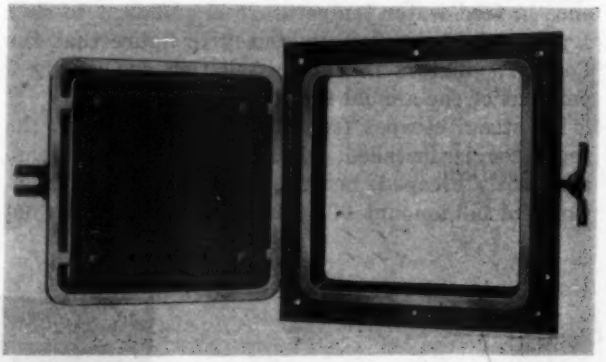
Handling

In nearly every case where goods of any kind are being transported over distances within the premises of a paper mill, mechanical devices such as lifting

apparatus, industrial trucks, cranes, monorail hoists, etc., may be used to a decided advantage in accomplishing the transportation quicker, better, and by affording substantial economies in space and labor.

New Ashpit Door

A perfectly tight ashpit door is essential to prevent combustion in the ashpit and air leakage through



some types of stokers. In this connection, consulting engineers and architects are often compelled to de-

sign a door for the particular purpose because they have been unable to find a suitable standard door that meets the requirement on the market. To meet this demand, the American Steam Conveyor Corporation, which specializes in all forms of ash disposal, has designed a door which it claims has successfully met every requirement.

According to their experience a door should be of ample size to allow easy removal of the ashes but beyond a certain limit there is trouble from warping and it also becomes too heavy to handle easily. For this reason the largest size made by this company is 24x36-in. and is the size recommended for ordinary

(*Continued on page* 313)

SOLUBLE AMERICAN BLUE

BINNEY & SMITH CO.
81-83 Fulton Street NEW YORK

Souze a sizable sample of KVP Vegetable Parchment paper in either hot or cold water—and it "comes up smiling." It is

Better Wet Than Dry

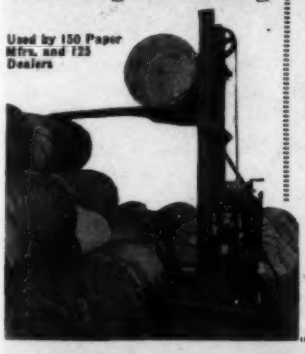
It saturates but does not fall to pieces. It will not lint. Contact with water makes it stronger. We have had a sack of this paper filled with water, hanging up for days with almost no loss of moisture.
KVP Vegetable Parchment paper is strong, protective, grease-proof and

Better Wet Than Dry

Secure samples from

Kalamazoo Vegetable Parchment Co.
KALAMAZOO, MICHIGAN
"The world's model paper mill"
Manufacturers of waxed and bond papers, and vegetable parchment

ECONOMY System of Storage Handling



Makes One Man Equal to Three

Sheer muscle power is not enough for piling heavy roll paper. "Reach" is needed, too. The Economy System provides both. It enables one man to lift as much as two thousand pounds right up to the ceiling and then push the roll into place. We want to tell progressive manufacturers and dealers more about this money-saving system.

Write for particulars

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NEW YORK ATLANTA DETROIT SAN FRANCISCO

SCREEN PLATES *and* **DANDY ROLLS**

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The Quick Service House
KALAMAZOO MICHIGAN

WE-FU-GO AND SCAIFE WATER
PURIFICATION SYSTEMS
SOFTENING & FILTRATION
FOR BOILER FEED AND
ALL INDUSTRIAL USES
WM. B. SCAIFE & SONS CO., PITTSBURGH, PA.

Premier & Potter Printing Press Co., *Inc.*

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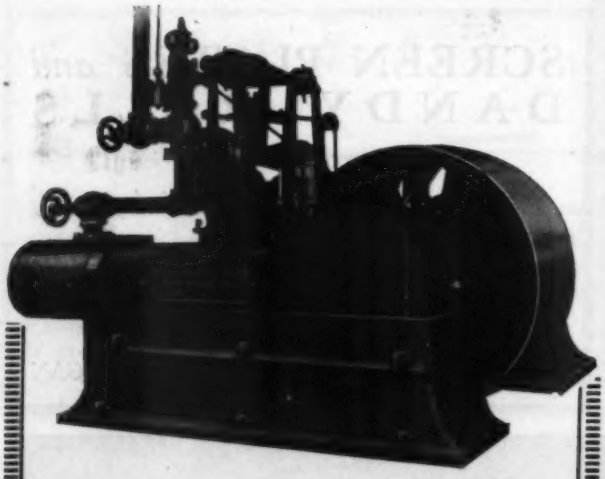
Vice-President



Variable and Constant SPEED ENGINES

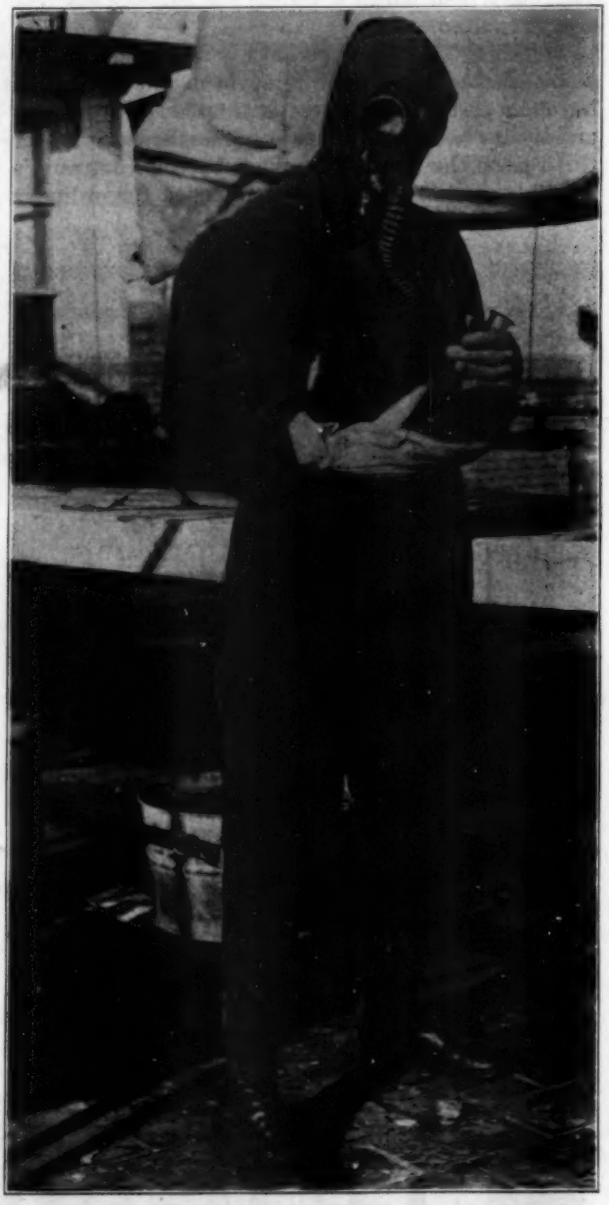
Paper Mill Economy is assisted very materially by the installation of High Grade Variable Speed and Constant Speed Engines.

Send for List of Installations and Catalogs

CHANDLER & TAYLOR COMPANY
Indianapolis, Indiana

Army Gas Masks in Industrial Use

Gas warfare with all its horrors has accomplished something which is of benefit in peace times. For every gas used there was developed an antidote—i. e.,



an absorbent—and now the army gas masks can be used for protection against various industrial gases, like chlorine, sulphur dioxide, hydrogen sulphide, smoke, etc.

The credit for developing the best fighting gas mask belongs to the American chemists. Only two months after America's entrance in the war, twenty-five thousand gas masks had been completed, and during the twenty-two months of our participation in the war over five and a quarter millions, so that

(*Continued on page* 309)

Bogalusa Appoints Sales Agent

THE increasing industrialism of the South is again rendered conspicuous by the appointment of Duncan & Spencer, of Chicago, exclusive agents for the Bogalusa Paper Company, Inc., of Bogalusa, La.—a plant with an interesting present and an interesting future in the manufacture of the liner and test board used in making fiber containers.

Bogalusa itself is a thriving young city founded by the Great Southern Lumber Company, which there, in the midst of its own vast timber holdings, operates the largest sawmill in the world, each day turning out 1,000,000 board feet of "Bogalusa Brand" Longleaf Southern Pine lumber.

But Bogalusa is not to abide by the habit of lumber towns and disappear upon the eventual though distant exhaustion of the surrounding forests. Bogalusa is built for permanence—permanence based on its highly legitimate expectation of becoming a great center for the manufacture of wood fiber products. Longleaf Southern Pine is especially adapted to the manufacture of fine and exceptionally strong fiber products, and though trees large enough for lumber will eventually disappear, natural reforestation will easily provide a truly inexhaustible supply of pulp wood.

Hence the establishment a few years ago of the Bogalusa Paper Company, modernly equipped and modernly organized in all respects.

It is the output of this plant that Duncan & Spencer have taken in hand.

The capacity of the pulp mill is 60 tons of sulphate pulp per 24-hour day.

The board mill is producing an excellent grade of container liner and test boards in a range of weights of .016 to .050.

The capacity of the board mill is 125 tons per 24-hour day, with the following equipment: Two six-mold Black & Clawson machines of the latest type especially designed for the character of board made. These machines trim 106 inches and 112 inches. There is a Cameron rewinder of 122 inches width which can turn out rolls up to 50 inches in diameter. The beater room contains 16 beaters, eight to a machine, and eight Jordan engines.

The mills are operated by a modern power plant which has the advantage of getting all its fuel from the sawmill of the Great Southern Lumber Company.

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Cut down *excessive* wrapping paper investment. Why carry two wrapping paper lines for one wrapping paper *purpose?*

MOSINEE

presents a perfect wrapping paper, weight and strength for each wrapping purpose. Made in all weights from 15 pounds to 100 pounds basis. The one complete, standardized and economical line of wrapping paper sold.

Mosinee Kraft

"The Wrapper that Delivers the Goods"

Ethyl Alcohol from Waste Sulphite Liquor Using an Acclimated Yeast

Results obtained from a series of investigations by the Forest Products Laboratory at Madison, Wisconsin, upon the production of ethyl (grain) alcohol from sulphite pulp mill waste liquor are as follows:

Of the 2.0 to 2.9 per cent total sugars found in waste sulphite liquor, about 55 to 62 per cent are fermentable and upon fermentation go to produce only ethyl alcohol.

Fermentations of the sulphite liquor conducted both on experimental and commercial scales showed a production of 0.7 to 1.15 per cent by volume of absolute alcohol. A plant with a capacity of 100,000 gallons of waste liquor would thus be able to produce 700 to 1,150 gallons of absolute alcohol per day. Since the alcohol produced from this source contains a small quantity of methyl alcohol but little further denaturing is necessary.

A comparison of yeasts showed that a yeast acclimated to sulphite liquor just prior to fermentation gave higher yields of alcohol than one which had been permanently acclimated to this liquor. The cost of the former process was enough greater, however, to discourage its use. This fact led the Laboratory to permanently acclimate a strain of beer yeast to this liquor and a culture was produced which gave results comparing very favorably with those obtained by the use of a freshly acclimated yeast.

A quite common custom of calculating alcohol yields from the sugar which disappears during a fermentation has been shown fallacious, since in some cases part of the sugar removed by fermentation forms substance other than alcohol.

Correct Moisture Content of Lumber

Shrinking and swelling of wood, as well as warping and twisting, are caused by changes in moisture content. Such changes always take place when the wood is not in equilibrium with the surrounding atmosphere. This state of equilibrium depends mainly upon the humidity of the air and to some extent upon its temperature.

Knowing the average temperature and humidity of any given region, as given by the Weather Bureau records, it is possible to determine the moisture content of wood corresponding to these conditions.

The following table, compiled from data secured by the Forest Products Laboratory of the U. S. Forest Service at Madison, Wisconsin, shows the mois-

Your Problem Solved

Nearly every mill has some place where a ventilating fan is needed. The conditions demand it and the business is suffering for the lack of it.

BUT! It seems impossible to find a place for the fan where any drive can be connected to it, or else the machines in the room are taking all the power available so that a fan cannot be added to the present load.

STYLE H K

The Perkins Direct Connected Electric Fan

can be put just where it will do the most good, regardless of the driving arrangements. You can get the wires to it anywhere. The controlling switch can be placed at any distance from the fan, wherever it is most convenient to operate. You will be surprised to find what a small amount of power will drive one of these fans. They are built for any kind of electric current and to suit practically any conditions of installation. Get our Special Circular for future reference. You may need it tomorrow if not today.

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Solid Manila Tag Board
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Bristol Ticket Board
Diamond Wall Board
Champion All Leather Heel Board
Also other standard and special grades to order

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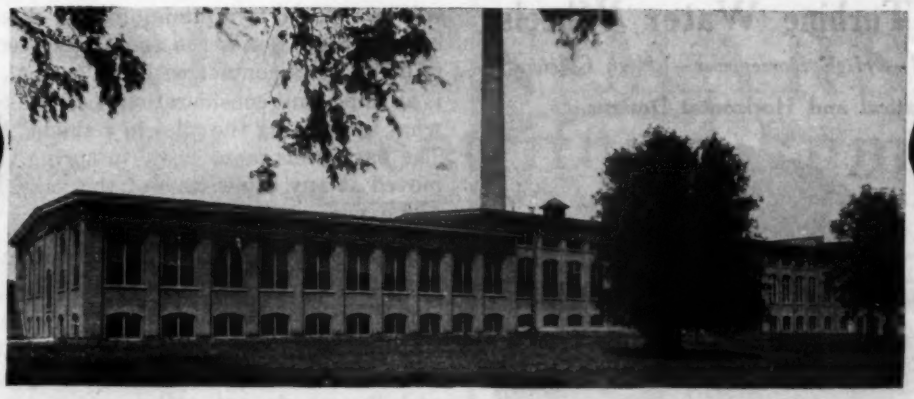

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LAKESIDE PAPER COMPANY

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"Our name stands for Quality"

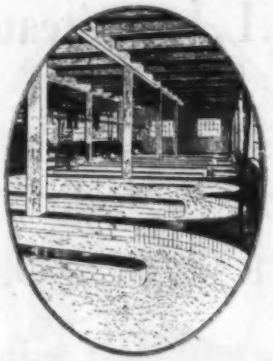
We are manufacturers of Bonds, Bible, Book, Catalogue, Eggshell, English Finish Opacity, M. F. and S. & S. C. French, Myriad Manifold, Tiffany Bond, Glazed, Unglazed, and Embossed, Gaza Onionskin, R. R. Writing, Writing Manila, High Cliff Mimeograph, White and Colored Laid Flats. Also other light and heavy weight M. F. and S. & S. C. specialties.

Quality and Service

From a Jobber:

"We are enclosing an order for two additional cars and think it would be well to add that your paper has been running very satisfactory and that it will probably be some little satisfaction to you to know that we are thoroughly satisfied with this sheet and think it well to give you a word of praise."

THE PRODUCTS OF INDIVIDUALITY



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Bleached
Sulphite Pulp

Furnished in Rolls—75% Air Dried or in Wet Laps

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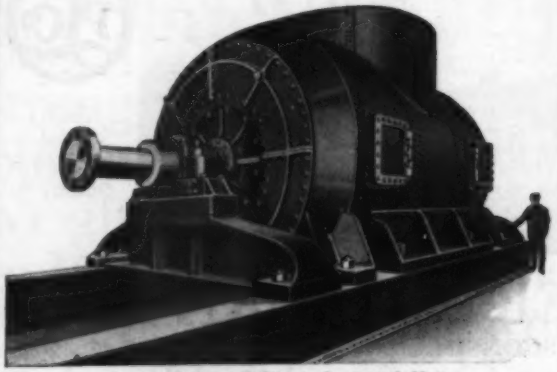
Eastern Manufacturing Company
501 Fifth Avenue New York

Mills at Bangor and Lincoln, Maine

Leffel Turbine Water Wheels

High Speed — High Horsepower — High Efficiency

Vertical and Horizontal Designs



Large Horizontal Direct Connected Unit

Write for Bulletin 54

The JAMES LEFFEL & CO.
SPRINGFIELD, OHIO

SALES ENGINEERS
B. F. Groff, 558 Woolworth Bldg., Lancaster, Pa.
L. B. Dow, Inc., 79 Milk Street, Boston, Mass.
H. H. White, 1503 Fourth Nat'l Bank Bldg., Atlanta, Ga.
William Hamilton Co., Ltd., Peterboro, Ont., Canada.

ture content in wood corresponding to various temperatures and humidities:

	—The moisture content of "dry" wood is—		
	At temperature 70° F.	At temperature 140° F.	At temperature 212° F.
When relative humidity of air is 20%	4.5%	3.3%	2.2%
When relative humidity of air is 30%	6.0%	4.5%	2.9%
When relative humidity of air is 40%	7.7%	5.9%	3.9%
When relative humidity of air is 50%	9.3%	7.1%	4.9%
When relative humidity of air is 60%	11.2%	8.8%	6.2%
When relative humidity of air is 70%	13.5%	10.7%	8.0%
When relative humidity of air is 80%	17.0%	14.0%	10.5%
When relative humidity of air is 90%	22.2%	18.2%	14.0%
When relative humidity of air is 100%	32.0%	26.2%	21.0%

Effect of Time of Cutting Timber on Its Durability

Many of the theories which have been advanced regarding the durability of wood attribute too much importance to the time of cutting. As a matter of fact, the time of cutting has very little effect upon the durability or other properties if the timber is properly cared for after it is cut. The method of handling logs at different times of the year, however, does influence their durability.

Late Spring and Summer Cutting

Logs and other rough products cut in late spring and early summer are more likely to be attacked by insects and fungi because the wood is freshly cut and in the most favorable condition for attack at a time when insects and the spores of fungi are most active. Seasoning also proceeds more rapidly during the warmer months and may cause excessive checking. If the wood is peeled when cut and piled openly on skids for seasoning the opportunity for decay will be reduced to a minimum, but checking will not be retarded. In no case should the wood be allowed to lie in direct contact with the ground. If checking is an important consideration it can be reduced somewhat by locating the piles in a shaded but dry place. The bark peels most easily in spring. It can be removed at any other time of the year, but the labor and expense will probably be greater.

Fall and Winter Cutting

Timber cut in late fall and winter seasons more slowly and with less checking than during the warmer months, and when proper storage or handling is impracticable, winter cutting is best. Fungi and insects do not attack wood out of doors in cold weather and by the time warm weather arrives the wood is partly seasoned and somewhat less susceptible to attack. It is for this reason that winter cutting is advantageous and not on account of a smaller amount of moisture or sap in the wood in winter, as the popular belief has it. There is practically no difference in moisture content of green wood in winter and summer.

Wastage of steam, hot water or compressed air is extravagance. All require coal to produce. Coal saved is money saved. Oil, gas and acids are tremendously important these days. Don't waste them.

SIGNODE SYSTEM

Framed Reams, strapped with Signode System

The Signode System delivers Framed Reams, Cases and Bales of Paper with the square corners in perfect condition.

Write for Particulars and Prices

The Signode System, Inc.
564 W. Adams Street CHICAGO, ILL.

Plate Press Felts

There is no better Plate Press Felt made than the "HAMILTON."

A trial is invited.

Satisfaction always guaranteed.

SHULER & BENNINGHOFEN
HAMILTON, OHIO

WOLVERINE
Paper Company

"Wolverine" Waxed Papers for Every Requirement

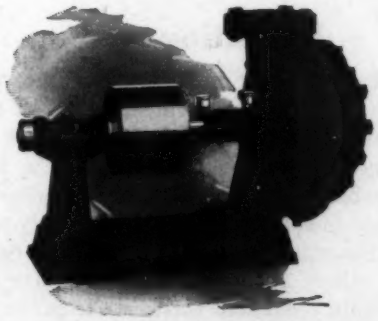
Best Quality

Waxed Tissue a Specialty

OTSEGO, MICHIGAN

AMERICAN-MARSH
Centrifugal Pumps

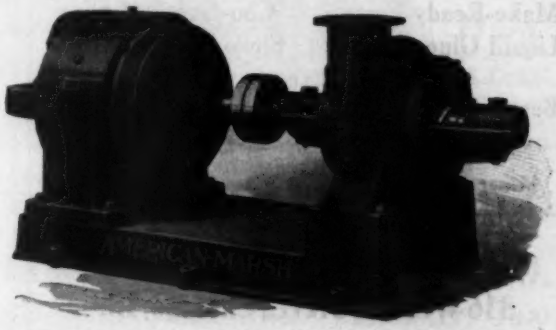
BELT OR MOTOR DRIVEN



Extra wide ring oiled bearings. Overhanging casing allowing the discharge to be taken at any angle desired. Removable outer head so that impeller may be withdrawn without disturbing the casing. Hydraulically balanced impeller insuring minimum end thrust. Impeller machined all over and turned to make a close running fit with the casing.

Finished with open runner for handling paper stock.

INVESTIGATE. ASK FOR BULLETIN No. 25.
Furnished Promptly Upon Request.



We Also Manufacture **Power Pumps, Deep Well Pumps, Boiler Feed Pumps, Vacuum Pumps, Horizontal Power Air Compressors.**

American Steam Pump Co.
Battle Creek, Michigan

Chicago Office, 1220 Monadnock Block.
New York Office, Whitehall Building, 17 Battery Place.

American Printers' Roller Mfg. Co.

316 W. Grand Ave., Chicago, Ill.

ECONOMY & UNIFORMITY of PRODUCT

Printers' Rollers

Are one of the most important tools of production in any pressroom. It is very important that your rollers be able to "stand up" under your conditions in order to enable you to produce GOOD PRINTING ECONOMICALLY.

If you have roller troubles of any description we will gladly prescribe the remedy for them.

ALSO MANUFACTURERS OF

Make-Ready Paste **Goo-Goo Pad Glue**
Liquid Glue **Flexo Padding Glue**

AND A FULL LINE OF THE

Best Grade Pastes, Glues and Adhesives

American Printers' Roller Mfg. Co.

316 W. Grand Ave., Chicago, Ill.

Resistance of Animal Glues to Moist Air

That there is a close relation between the viscosity, and therefore the grade of animal glues and their moisture resistance is strongly indicated by recent tests made at the Forest Products Laboratory.

Test specimens were made of two pieces of 1/8" birch veneer glued together with the grain in opposite directions so as to give 1 square inch of glued joint surface. The specimens were suspended in a humidity chamber with a 1-pound weight hung on each, and the time required for failure of the glue joint was noted. The first two tests were made at 98 per cent humidity. In the third test, the specimens were kept at 90 per cent humidity for 120 hours, after which the humidity was raised to 98 per cent. No failure occurred at 90 per cent. The temperature used in each test was about 80° F.

RESISTANCE OF GLUES OF DIFFERENT VISCOSITY TO MOIST AIR

	—Glue Used—		—Test No. 1—		—Test No. 2—		—Test No. 3—	
	Relative Viscosity (Engler)	Jelly Strength by Smith Tester	No. Specimens Used	Av. No. Hours Before Failure	No. Specimens Used	Av. No. Hours Before Failure	No. Specimens Used	Av. No. Hours Before Failure†
No. 13..	1.62	222	2	10½	4	12	4	24
No. 7*..	...	...	..	....	4	12	4	24
No. 36..	1.70	219	2	12 1/7	4	14½	4	24
No. 37..	1.92	256	2	13	..	..	4	44
No. 34..	2.00	267	2	17	4	26½	4	48
No. 35..	2.90	315	2	42	4	36	..	..
No. 19..	4.98	356	4	59½	..	..	..	..
No. 21..	4.14	335	..	....	4	48	4	66
No. 9..	5.48	416	..	....	4	66½	4	198

*A vegetable glue. †After raising humidity to 98 per cent.

The results indicate that the moisture resistance of animal glues is proportional to the viscosity, jelly strength, and grade.

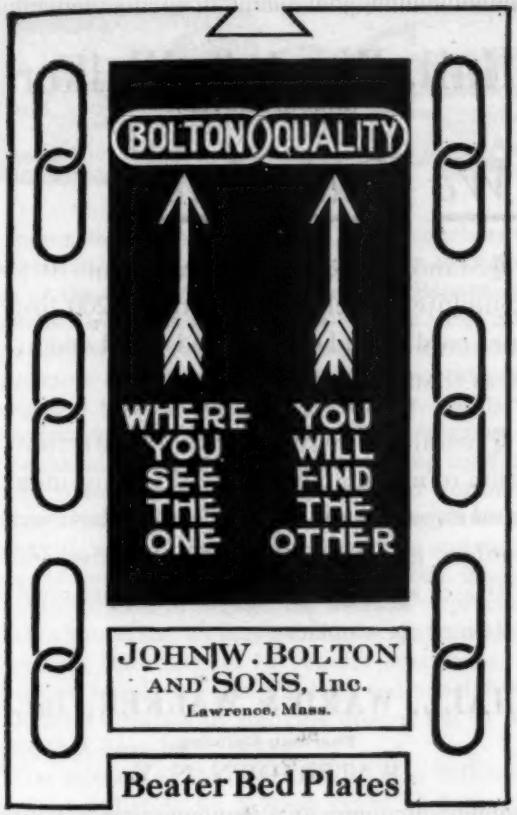
Insulation

Losses due to imperfect insulation on uncovered steam pipes, or where these coverings are not complete or efficient, are of considerable importance.

The unprotected pipe or valve wastes a large amount of valuable heat which ought to be conserved. Saving of energy in the form of steam not only saves coal but is equivalent to increasing the boiler capacity. A square foot of bare pipe at the ordinary temperatures of steam pipes will waste six to seven tons of coal a year.

STEAM PRESSURES	STEAM TEMPERATURES	THICKNESS OF INSULATION
0 to 25 lbs.	212 to 267° F.	1" or Standard
25 to 100 lbs.	267 to 338° F.	1½"
100 to 200 lbs.	338 to 388° F.	2" or Double Standard

When making any changes in the steam transmission around the mill, use as short steam piping as possible and insulate it thoroughly. This practice may cost more for installation, but it is the last cost; while the loss by radiation goes on continuously.



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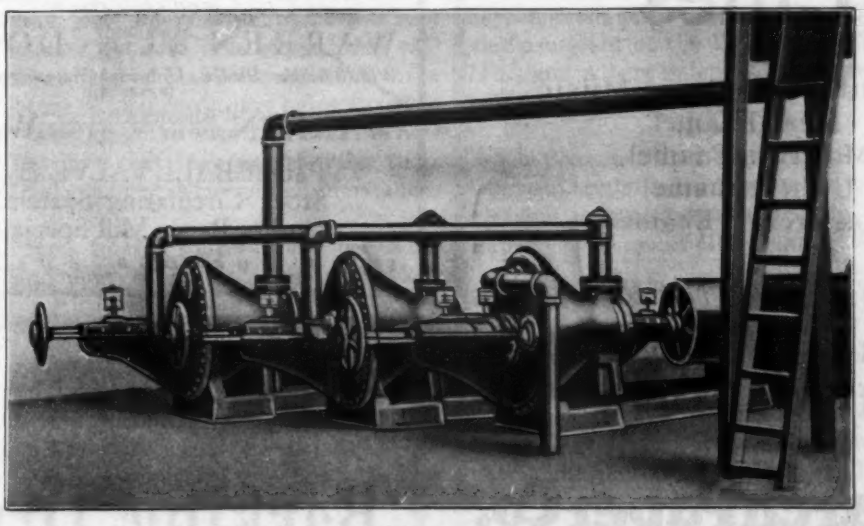
CLAFLIN CONTINUOUS BEATERS

They Save Power

Floor Space

Labor and Upkeep



They Can't Be Beat For Stuff That's Hard To Beat

¶ Claflin Continuous Beaters will handle the hardest kind of stock, direct from the cookers, and prepare it ready for the machine without any regular Beating Engines.
¶ Whether run in tandem or singly in connection with regular Beating Engines, they are gluttons in the amount of work they do.
¶ The harder the fiber is to handle, the greater the results in using these machines.
¶ On Rope Manilas, on Kraft Papers, Fibre Board, Wall Board, Leather Board or Pulp Screenings they do specially good work.
¶ If you are not getting best results from your Sulphite Screenings, or if some of this material is wasted, you ought to let us show you what can be done with a Claflin Continuous Beater.

¶ The Claflin Continuous Beaters now in use have demonstrated the fact that they will do a better job of Beating and Brushing for one-fourth the Floor Space, one-half the Power and one-third the cost.

Write us for information.

CLAFLIN ENGINEERING CO.

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Lancaster, Ohio

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YOUR LINES can be strengthened by adopting

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C1S Litho, Label and Music
Ideal Enamel
Mohawk Enamel
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OFFSET PAPERS:
Bulking Eggshell
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Monarch Paper Co.
Kalamazoo Mich.

3 Paper Machines 15 Coating Machines

Hall, Ward & Walker
(INCORPORATED)

We Guarantee

¶ Standard news with less than 10% Sulphite, a yield of more than 2200 lbs. per cord peeled or prepared wood and at less than 65 H. P. per ton.

¶ Installations made without interruption of manufacture and for time of men and expenses only. No charge whatever unless guaranty fulfilled. License fee 10% of saving made or 20 cents per cord at licensee's option.

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Sherman Building
WATERTOWN, N. Y.

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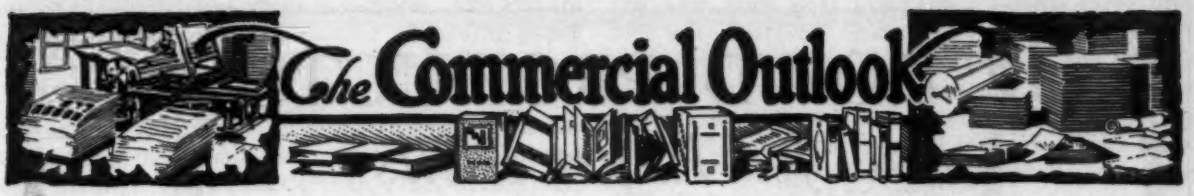
MANUFACTURERS OF
WARREN IMPROVED CALENDER DOCTORS
With Flexible Blades, Universal Adjustment and Control
(PATENTED)
WARREN IMPROVED PATENT DOUBLE DRUM WINDERS
Patent BALL VALVE Hydrant
Stock Circulating Systems *and*
other Paper Mill Specialties
SEND FOR OUR BULLETIN

H. O. NUMAN

Barking Drums

Green Bay, Wis.



Increasing strength in prices and a consistent expansion of activity are the outstanding characteristics of the paper market at present. Reports from various directions are nearly all of the same hue in that they tell of a steadily broadening demand from consumers and of manufacturers consequently being compelled to increase their operations. Mills with very few exceptions are securing all the business they are enabled to cope with under prevailing conditions. If the labor situation was different and workmen of a type suitable for paper manufacturing plants more plentiful, mills could probably handle a greater volume of business, but with experienced labor extremely difficult to engage, the average papermaking establishment has its hands full, literally speaking, in supplying the wants of its regular customers. The situation, in fact, is rapidly getting to the point where it is not a question of securing orders, but of filling those that have been booked.

The signing of the peace treaty was followed almost immediately by a fresh spurt of demand for virtually all grades of paper. Consumers and jobbers appeared to have regained new confidence in the underlying strength of prices and came into the market for additional large amounts of stock. Jobbers give every evidence of at least restoring their stocks to normal volume; consumers seem to have a sole idea in view, namely, to store up a supply that will make them independent of market conditions for a time. Manufacturers, as a result, are being taxed to the utmost in satisfying the wants of buyers notwithstanding the fact that they are running their machines to as full capacity as current circumstances will permit.

The demand from foreign sources for paper is becoming more and more of a factor in the market. With shipping facilities improved and with buyers in South American countries and elsewhere looking to the United States and Canada for their paper supplies, exporters are conducting a larger business than possibly ever before in the history of the industry on the American continent. Indications point to the retention of a large measure of the business now being developed in foreign lands. Manufacturers are devoting a great deal more attention to the wants of consumers in other countries, are studying the correct ways in which to pack paper for export, and are effecting necessary financial arrangements with a view of securing foreign markets for their product which may be held for all time.

Book papers of every grade are in very active demand, and most mills have so much unfilled business in hand that they are compelled to refuse to enter into further engagements. Fine papers are moving in steadily increasing volume and prices are gradually advancing. Many of the cheaper lines of bond and ledger paper have been withdrawn from the market which of course reverts demand to the higher quality grades. Coarse papers are in a very firm market position, with demand undergoing consistent expansion and with quotations on the uptrend. News print is being absorbed as rapidly as it becomes available at steady prices, while tissue, cover and other grades are freely sought. The market for boards is more active and prices are commencing to look up.

News Personals

New York, July 15.—The tide of travel, insofar as applying to members of the local paper and paper mill supply trade, certainly points Europeward. There is at present possibly a greater number of pulp, paper and supply men from the U. S. on the other side of the Atlantic than in many a long day. Some of the recent ocean travelers include Sigmund Goldman, of the Perkins-Goodwin Company; Emanuel Salomon, of A. Salomon, Inc.; Frederick Enders, vice president of the Wood Pulp Trading Company, Ltd.; and Albert Salomon, of Salomon Bros. & Company.

The Seaman Paper Company, of 200 Fifth avenue, has been appointed selling agent in the East for the glassine papers manufactured by the Rhinelander Paper Company, of Rhinelander, Wis.

The capital stock of A. J. Pagel & Company, Inc., pulp importers and dealers of 347 Madison avenue, has been increased from $100,000 to $350,000.

Harold Hughes, formerly purchasing agent for the Robert Gair Company, of Brooklyn, N. Y., is now a member of the selling staff of the Pulp and Paper Trading Company, of 21 East Fortieth street.

William C. Powers, formerly sales manager of the Great Northern Paper Company, is scheduled to sail from New York this month for England to assume his new duties as president of the W. C. Powers & Company, Ltd., organized a short while ago and

(*Continued on page 305.*)

DOWD PRODUCTS
for Paper Mills

The name *DOWD* stands for quality—first, last and all the time. A worth-while name to look for.

MANUFACTURERS OF

Beater Bars, Bed Plates, Rag Knives, Paper Cutting Knives, Barker Knives, Chipper Knives, etc., etc.

Write *DOWD* of Beloit on your cutting problems and profit by a very valuable experience.

R. J. DOWD KNIFE WORKS

Makers of Better Cutting Knives Since 1847

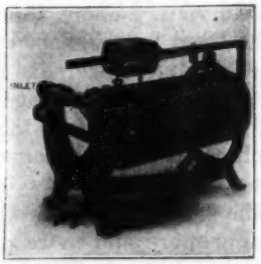
Beloit, Wisconsin

CRANETILT STEAM TRAPS SAVE COAL
IN PAPER MILLS

DIRECT RETURN TRAP

Made in sizes ½ to 4 inch, capacities up to 28,000 pounds of water discharged an hour.

These machines are very rigid and practically indestructible. They have no internal working parts. All discharging openings are equal to or higher than the pipe connections and all valves and seats are easily removable and renewable.



NON-RETURN TRAP

Made in sizes ¼ to 3 inch, capacities up to 112,500 pounds of water discharged an hour.

Buy Steam Traps on their discharging capacities—not by pipe sizes.

Sales Offices, Warehouses and Showrooms:

Boston, Springfield, Bridgeport, New York, Brooklyn, Philadelphia, Newark, Camden, Baltimore, Washington, Syracuse, Buffalo, Savannah, Atlanta, Knoxville, Birmingham, Memphis, Little Rock, Muskogee, Tulsa, Oklahoma City, Wichita, St. Louis, Kansas City, Terre Haute, Cincinnati, Indianapolis, Detroit, Chicago, Rockford, Grand Rapids, Davenport, Des Moines, Omaha, Sioux City, St. Paul, Minneapolis, Duluth, Fargo, Watertown, Aberdeen, Great Falls, Spokane, Seattle, Tacoma, Portland, Pocatello, Salt Lake City, Ogden, Sacramento, Oakland, San Francisco, Los Angeles

FOUNDED BY R. T. CRANE, 1855

CRANE CO.

836 S. MICHIGAN AVE.

CHICAGO

Works: Chicago and Bridgeport.

CRANE, LIMITED—Montreal, Que., Toronto, Ont., Winnipeg, Man., Vancouver, B. C.

which has established offices in London. The Powers company will represent a number of leading paper mills of the United States and Canada in Europe.

Walter E. Ihling, who enjoys a wide acquaintanceship among paper manufacturers, is now associated with the R. T. Vanderbilt Company, Inc., of this city, and will act as salesman for its clays. Mr. Ihling was formerly in business in Kalamazoo, Mich., dealing in wood pulp and other papermakers' supplies. He gave up his business there to enter the army, from which he was recently released. The R. T. Vanderbilt Company, Inc., are large handlers of American clays for the paper trade, having mines in Georgia, South Carolina and Pennsylvania.

The Howard Paper Company, of Urbana, O., and the Aetna Paper Company, of Dayton, O., have opened New York offices in the Stewart Building at 280 Broadway. William H. Clark, for several years eastern sales representative of these mills, is in charge.

The Paper Service Company has severed business relations with the Industrial Paper Company, of 462 Broome street, New York, and no longer carry a stock of toilet paper and paper towels at the above address. All business is now conducted from the home office at Hinsdale, N. H.

We are glad to announce that Mr. William F. O'Shea, for many years connected with the Henneberry Company, has recently joined the selling organization of the Premier and Potter Printing Press Co., Inc. Mr. O'Shea is well known to the printing trade and we wish him success in his new venture. His territory covers the entire west and he will sell the Premier printing press and the Potter offset press.

Samuel F. Joor, a well known consulting engineer of Chicago, has joined the American Steam Conveyor Corporation, Chicago, in a capacity of sales engineer. Mr. Joor has had wide experience in the conveyor field, at one time being western manager and sales engineer of the Jeffrey Manufacturing Company and previous to that with the Link Belt Company.

Big Pulp Fire

A quantity of wood pulp, estimated to be worth between $125,000 and $175,000, belonging to the Scandinavian American Trading Company of New York City, was destroyed by fire on June 28 at Baltimore. Spontaneous combustion is supposed to have been the cause of the fire, which started at the pier where the pulp is stored and swept the plant of the New York Boat Company. Twenty-three firemen were overcome fighting the blaze.

N. Johaneson, the vice president of the Scandinavian American Trading Company, said that the loss of the pulp was completely covered by insurance, and added that a small tonnage of the same quality of pulp is at hand at Newport News to take care of the wants of his customers.

The American Writing Paper Company has revised its sales territories to make them more workable and convenient in serving its customers and in soliciting business.

For one thing, a Boston office has been established at 77 Franklin St., Room 504, Columbian Life Building, with Mr. Charles B. Foster, formerly Washington manager, in charge. This office will meet the increase of business in New England territory and furnish a means of closer relationship with customers consistent with "Eagle A" principles of personalized service. Mr. Foster will devote himself exclusively to the Eastern New England paper trade, particularly that of Boston and its vicinity.

The active field men in the A. W. P. Co.'s sales territories are:

New England—Charles B. Foster, manager, 77 Franklin St., Boston, Mass.; James L. Wallace.

Boston City—Charles B. Foster, manager.

New York City—L. F. Hayward, solicitor, 41 Park Row, New York City; W. H. Haskell, Jr., E. C. Chadwick, Lawrence Stedman, W. B. Hunter.

Buffalo—John L. Forsythe, solicitor.

Philadelphia—W. B. Snyder, manager, The Bourse, Philadelphia.

Washington—Guy V. Norwood, manager.

Southern—H. Carroll Jamerson, no office established.

Chicago—J. L. Lemmon, manager; G. J. Cadwell, W. A. Jones, K. M. Dodson.

Pacific Coast—Charles P. Armstrong, manager.

Department of Sales—Traveling from Holyoke: J. C. De Coster, manager papeteries and book section; R. C. Chapin, manager envelope section; G. M. Holbrook papeteries; F. W. Hastings, Jr., manager shaded watermark papers; W. J. Blackley, covers; L. R. Coppage, specialties; R. D. W. Ewing, special; C. Allen Bowles, special; George A. MacAlpine, Windsor products.

A heavy rain removed all danger to villages of the upper peninsula threatened for a week by forest fires. The situation was also greatly improved in the northern part of the lower peninsula.

Mackinaw City was in the path of the blaze, which had approached to within two miles of the town last night when it was checked by the rain. The village of Tower was also threatened with destruction, several houses having been burned when the storm broke.

E. B. THOMAS & CO.

INCORPORATED

ALFRED J. MORAN, Manager

100 Hudson St., NEW YORK

IMPORT EXPORT

HIGH GRADE

Paper Manufacturers' Supplies

RAGS—PAPERSTOCK
ROPE—BAGGING
STRINGS

INQUIRIES INVITED

FRANCIS HUGHES COMPANY

Paper Mill Supplies

CORRESPONDENCE SOLICITED

Private Switch on C. B. & Q. Tracks

21st Street at Loomis
CHICAGO, ILLINOIS

Main Paper Stock Co.

Incorporated

PACKERS OF WASTE PAPER STOCK

Old and New Rags, Bagging, Strings, Etc.

Importers—Exporters

Daily Capacity 300 Tons

Branches:
321 Pearl Street
423 East 132nd St.

General Offices and Warehouses:
25-31 Peck Slip, New York

Boston (Mass.) Office—10 High Street

Established 1885 *LONG DISTANCE PHONES Harrison 5557-2840*

—*To* PAPER Manufacturers

Here is a message of interest for you.

¶ We pack forty different grades of Paper Stock.

¶ Our Daily Capacity is 300,000 pounds.

¶ We can give you both Quality and Quantity.

Send us your inquiries on the grades you want to use in your product.

MENDELSON BROS. PAPER STOCK CO.

General Offices, STANDARD OIL BUILDING
910 South Michigan Boulevard, CHICAGO

"The house with whom you eventually will trade"

Chipper Knives

Almost any of the large mills will tell you how good WHITE KNIVES are.

Want us to tell it to YOU?
One set will do it. Write us.

The L. & I. J. White Co.

85 Columbia Street, BUFFALO, N. Y.

Papermaking Rags

The main feature in the rag market during the past several weeks has been the lively demand for roofing material and the sharp advance in prices on this class of rags. No. 1 roofing stock has sold at $60 per ton at the point of shipment, and packers who have secured this price are now holding for higher figures notwithstanding reports to the effect that large quantities of roofing rags are en route to this market from Europe. Felt paper manufacturers have freely met the prices quoted, their need for raw material being such that they have been compelled to ignore the figures demanded in their anxiety to obtain supplies, as the market is still advancing and the end is nowhere in sight.

Old whites and thirds and blues continue to move in good volume and at strong quotations. No. 1 repacked whites are selling freely at around 7 cents f. o. b. New York, while sales of selected packing of these rags have been recorded up to 9.50 cents at the mill. Repacked thirds and blues of country origin command in the neighborhood of 4.50 cents New York and rough blues 3.75 cents. New cuttings are firmly priced and are readily sought by manufacturers. White shirt cuttings of No. 1 quality are selling at 13.00 to 13.50 cents a pound at the shipping point, washables at 8.00 to 8.25 cents, fancies at 9.50 to 9.75 cents and muslins at 11 cents. Prices f. o. b. New York follow:

New Stock—

White shirt cuttings, No. 1	13.00-13.50
White shirt cuttings, No. 2	8.75- 9.00
Fancy shirt cuttings	9.50- 9.75
Washables, No. 1	8.00- 8.25
Unbleached muslins	10.75-11.00
White lawns	11.50-12.00
Overall cuttings, blue	9.75-10.00
Black silesias	5.25- 5.50

Old Stock—

Whites, No. 1 repacked	6.75- 7.25
Whites, No. 2 repacked	5.25- 5.50
Whites, house soiled	4.00- 4.25
Whites, street soiled	3.50- 3.75
Thirds and blues, repacked	4.25- 4.50
Thirds and blues, rough	3.75- 4.00
Black stockings	3.60- 3.80
Lace curtains	6.25- 6.50
Cotton canvas, No. 1	5.00- 5.25
White cotton batting	4.85- 5.00
Roofing, No. 1	2.80- 3.00
Roofing, No. 2	2.70- 2.80

Old Papers

Business of fairly good volume is passing in waste papers and the market from every point of view is in a stronger position than for a long time. Consumers are placing orders for larger tonnages and with a greater degree of regularity, while prices have worked up to levels where there is not so much complaint among sellers over their inability to do business at a profit. Material for book paper mills still leads the demand, and supplies of books and magazines and soft white shavings find a ready outlet among manufacturers. Sales of No. 1 heavy book stock at 1.80 to 1.90 cents f. o. b. New York are being freely made, and soft white shavings of No. 1 grade are fetching around 3.25 cents New York. Kraft paper is up a bit in price, revised quotations ranging from 2.35 to 2.50 cents, while folded newspapers and mixed paper are moving in larger volume and at firm prices. F. o. b. New York quotations are:

	New York and Chicago
Hard white shavings, No. 1	4.15-4.35
Hard white shavings, No. 2-3	3.75-4.00
Soft white shavings	3.25-3.50
Colored shavings	1.30-1.40
Heavy book, No. 1	1.80-1.90
Crumpled, No. 1	1.40-1.50
Ledger stock	2.35-2.50
Kraft, No. 1	2.35-2.50
Manilas, No. 1	1.00-1.10
White blank news	1.10-1.20
Overissue news, No. 1	.95-1.00
Folded news	.65- .75
Mill wrappers	.90-1.00
Box board cuttings	.60- .65
Mixed paper, No. 1	.55- .60
Common paper	.40- .45

Rope and Bagging

Demand for old rope and strings is quite brisk, while on the other hand buying interest in scrap bagging continues quiet. Mills are actively absorbing all the old manila rope found available at between 5.50 and 5.75 cents a pound f. o. b. New York, and mixed strings are freely selling at 2.25 to 2.50 cents. No. 1 scrap bagging is quotable at 2.40 to 2.60 cents New York, with only a casual demand emanating mostly from mills consuming limited amounts of bagging. Gunny is firm and in moderate demand. Prices f. o. b. New York are:

	New York and Chicago
Gunny, No. 1 domestic	2.75-3.00

(*Continued on page 309.*)

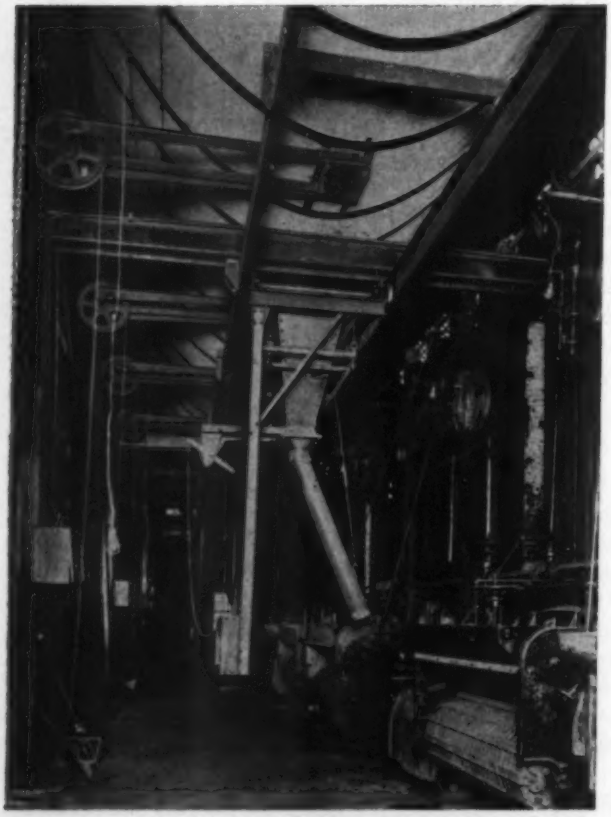
Northern Paper Mills

"The Standard of Excellence"

"Northern" Toilet Papers
"Northern" Inter-Folded Towels
"Northern" Roll Towels

CAPACITY 100,000 LBS. PER DAY

NORTHERN PAPER MILLS, GREEN BAY, WIS.



Brownhoist Locomotive Cranes *and* Concrete Coal Bins

Are Absolute *Necessities* in All Pulp and Paper Mills

also

Coal Handling Machinery	Transfer Cars
Trolleys	Lorries
Tramrail Systems	Buckets
Hand Traveling Cranes	Tubs
Electric Hoists	Concrete Bins
Mono-rail Systems	Wharf Cranes
Crabs and Winches	Hoists

THE BROWN HOISTING MACHINERY CO.
Cleveland, Ohio, U. S. A.

(Continued from page 307.)

Gunny, No. 1 foreign	3.00-3.25
Scrap bagging, No. 1	2.50-2.75
Roofing bagging	2.20-2.30
Wool tares, heavy	3.00-3.25
Wool tares, light	2.75-3.00
Manila rope, No. 1 foreign	5.50-5.75
Manila rope, No. 1 domestic	5.50-5.75
Sisal strings	2.40-2.60
Mixed strings	2.25-2.50

A Flexible Power System

(Continued from page 281)

obtained by means of mechanical speed changing devices.

The fourth machine, however, is provided with the complete Westinghouse system of paper machine drive. In this system, the power is divided into two parts. The screens and pumps of the wet end are driven by constant speed alternating current motors, but the dryers and other parts of the variable speed end are operated by a 75 HP. direct current motor, which receives its current from a 60 KW. synchronous motor generator set.

The motor has a speed range of 5 to 1. A two-step cone pulley is also used so that a range of paper speed from 25 to 125 feet per minute can be obtained on one cone, and from 40 to 200 feet per minute on the other. This 5 to 1 speed range motor is somewhat less expensive than one from which the entire 8 to 1 speed range could be obtained electrically, and since the class of stock made on the machine is not changed frequently, the inconvenience involved in changing from one step to the other on the lone pulley is negligible.

The motor is controlled by means of conveniently located push buttons adjacent to the paper machine and the motor. The motor is started by pressing a button marked "start," and it accelerates to a panel corresponding to the previous position of the combination field rheostat. The speed can be increased further by pressing a button marked "fast." An indicator shows the paper the speed, and pressing a button marked "stop" stops the machine. The actual electrical connections necessary to control the motor are made by magnetic switches and a motor operated field rheostat.

Another interesting motor application in this mill is the use of Westinghouse squirrel cage motors with high resistance end rings for driving the rag cutters. This type of motor has the characteristic of drawing relatively low current with high starting torque and slowing up whenever an extra heavy load is thrown on it, and then exerting a corresponding increase in power. This feature is useful when the knives of the cutter become jammed.

(Continued from page 294)

every soldier going across was equipped with an American gas mask. For this work the chemical warfare service of U. S. A. and the splendid co-operation of the American manufacturers are responsible. The special comment of the War Department is as follows:

*"The American attacking forces are protected against gas by masks which actual field tests prove to give twenty times the protection afforded by German gas masks."

The essential features of the army gas mask, as given by the official report of Chemical Warfare Service, are as follows:

1. A canister of metal containing both neutralizing and absorptive chemicals and a smoke filter. The chemical filling consists of 42 cubic inches of intimate mixture of 60 per cent charcoal and 40 per cent purple soda lime (by volume), also two cotton wadding pads. The air to be breathed passes in through an inlet check valve and through the chemicals and smoke filter.

2. A flexible rubber hose through which the purified air passes from the canister to the facepiece.

3. A facepiece effectively covering the eyes, cheeks, lower forehead, nose, mouth, and chin, provided with eyepieces permitting vision, and a harness to hold the facepiece in place when wearing the mask.

4. An inhalation valve which affords easy discharge of inhaled air and at the same time instantly closes upon inspirations.

5. A knapsack slung from the neck or shoulders in which the mask and canister are carried.

The latest developed gas mask affords better comfort and vision than the mask actually used in the army. It has no noseclip and mouthpiece, but the air as it comes from the canister passes over the eyepieces before it is inhaled.

Recently Mr. A. C. Fielder of the Chemical Warfare Service published the results of tests for the protection offered by the army gas masks against various gases, and recommends the gas mask for industrial use. The paper manufacturer will find the gas mask very useful against smoke, sulphur dioxide and chlorine. Gas masks of the latest type used by the army have already been placed in the market.

*Journal of Industrial and Engineering Chemistry, March, 1919.

The Monroe Binder Board Company of Monroe, Mich., is preparing plans for the erection of a box factory, which will have a floor space of approximately 125,000 square feet. It will be one story and basement and concrete, steel and brick will be the materials used.

J. C. Bulls, former president and founder of the J. C. Bulls Manufacturing Company of St. Louis, Mo., has become connected with the Monroe company and will become manager of this branch of the business.

Phones 2074 2075 Murray Hill

JOHN ASPEGREN, Pres.
NILS R. JOHANESON, V. Pres. & Gen. Mgr.

SCANDINAVIAN-AMERICAN TRADING COMPANY

50 East 42nd Street
NEW YORK CITY

Importers and Exporters of
CHEMICAL WOOD PULP *of* **ALL KINDS**

Dealers in
Domestic Sulphites, Kraft Pulps and GROUND WOOD

Agents for **PAPER MILL SUPPLIES**

PRICE & PIERCE, Ltd.

30 E. 42d Street, New York

Sole Agents

BATHURST LUMBER CO., Ltd.
Bathurst, N. B.

EASY BLEACHING SULPHITE AND KRAFT PULP

Also

ATLANTIC PAPER & PULP CORP.
Savannah, Ga.

KRAFT PULP

J. ANDERSEN & CO.

FREDERICK BERTUCH, SPECIAL PARTNER
21 East 40th Street, New York City

Importers of Chemical Pulps
BLEACHED AND UNBLEACHED

Agents for Kellner Partington Paper Pulp Co., Ltd.
Sarpsborg, Norway; Forshaga, and Edsvalla, Sweden;
Bergvik and Ala Nya Aktiebolag, Söderham, Sweden

N.O.C. N.O.C.

NEW YORK OVERSEA CO. INC.

Importers and Exporters of
WOOD PULP and PAPER
Offices located all over the World

New York	Christiania
Stockholm	Teneriffe
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Genoa	Hong-Kong
San Francisco	Shanghai
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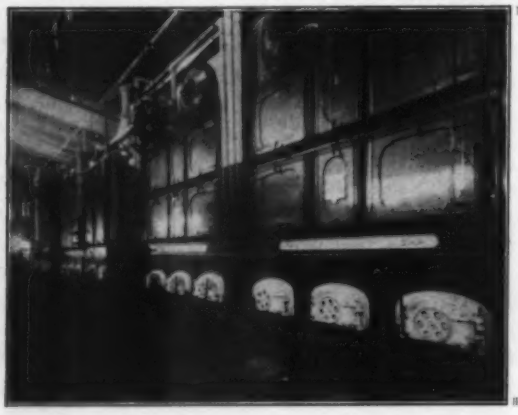
Calcutta	Batavia
Samarang	Durban
Surabaya	Cape Town
Valparaiso	

NEW YORK 17 BATTERY PL. U.S.A.

N.O.C. N.O.C.



Paper mill boiler plants are handling their ashes the American way.

AMERICAN
STEAM ASH CONVEYORS

eliminate ash wheelers and reduce boiler room labor overhead. The first cost is low, maintenance negligible. Turn a steam valve and shovel ashes into conveniently placed ash intakes—that's all. Endorsed by leading paper mills. See Catalogue P for full information.

AMERICAN STEAM CONVEYOR CORPORATION
Ash Disposal Engineers
CHICAGO: 326 W. Madison St. NEW YORK: 110 W. 40th St.
Sales Engineering Offices in Principal Cities

New Papers

Writing—	
White rag	18-35
White sulphite, No. 1	11-20
Colored	12-21
Ledger—	
White rag	18-38
White sulphite	13-21
Colored sulphite	15-
Colored rag	21-
Bonds—	
White rag	15-45
White sulphite	12-20
Colored sulphite	13-25
Colored rag	15-45
Book—	
No. 1 S. & S. C	8.50- 9.00
Machine finished	8.00- 8.50
English finished	8.00-12.00
Coated and enamel	10.50-14.00
Lithograph, M. F	8.75-12.00
News Print—	
Rolls, contract	3.75- 4.00
Rolls, transient	4.00- 4.25
Sheets	4.50- 4.75
Side runs	3.75- 4.00
Cover Stock—	
Coated, both sides	12.25-
Coated, one side	12.00-
Wrappings—	
No. 2 kraft	7.75- 8.00
No. 2 kraft	6.50- 7.00

Boards—	New York	Chicago
Solid news	47.50-50.00	45.00-47.00
Straw	35.00-37.50	35.00-37.50
Plain chip	37.50-42.50	40.00-42.50
White coated chip	60.00-65.00	60.00-62.50
Manila coated chip	65.00-70.00	60.00-62.50
Binders board	70.00-75.00	75.00-80.00

Mechanical Pulp

Business in mechanically ground wood has assumed much broader proportions during the past several weeks and the market has worked into a decidedly stronger position. Prices are higher by a couple of dollars a ton, eastern grinders now quoting from $28 to $30 at the producing mill, and there is very little selling pressure in evidence. Already reports have been received concerning drouths in some grinding sections and predictions are being openly made that a shortage of pulp will develop before the end of the summer.

Chemical Pulp

Demand for domestic chemical wood pulp of virtually every grade is undergoing steady expansion and the tone of prices shows additional strength. Quotations on bleached sulphite are distinctly firmer, and manufacturers who a short time ago were selling No. 1 bleached at 5 cents a pound are now insistent on 5.50 cents, while several mills producing an extra strong bleached pulp are securing 6 cents for their product. News print sulphite is firmly quoted at a range of 3.25 to 3.50 cents at the mill, while easy bleaching is held at 4.25 to 4.50 cents and soda pulp at 4.50 to 4.75 cents. Inquiry for kraft pulp is on the increase and the movement of this grade is improved to an extent, although demand still involves relatively smaller tonnages than of other pulps. Quotations f. o. b. pulp mills are:

Bleached sulphite	5.50-6.00
Easy bleaching sulphite	4.25-4.50
News grade sulphite	3.25-3.50
Soda pulp, bleached	4.50-4.75
Mitscherlich unbleached	4.75-5.00
Kraft, No. 1	3.75-4.00
Screenings, refined	1.25-1.50

Chemicals

The chemical markets rule generally firm and the tendency of prices in most instances is upward. Bleaching powder is higher by a quarter of a cent, while advances also have been scored by soda ash and caustic soda. Quotations on brimstone are slightly lower, and casein prices also have eased off a bit owing to heavier receipts of foreign casein. Prices follow:

Alum, lump ammonia	4.25- 4.50
Alum, lump starch	9.00- 9.50
Alum, powdered	4.50- 5.00
Blanc fixe	4.00- 4.25
Bleaching powder (domestic drums)	2.25- 2.50
Brimstone (ton)	18.00-20.00
Casein	13.00-15.00
Caustic soda	3.00- 3.15
China clay, domestic, washed	11.00-13.00
China clay, foreign	15.00-20.00
Rosin, grade E	16.50-
Satin white	2.25- 2.50
Soda ash, 58 per cent light (bags)	1.85- 2.00
Sulphate of alumina, commercial grade	1.75- 2.00
Starch, Globe, in bags	5.62-
Talc (ton)	12.00-20.00

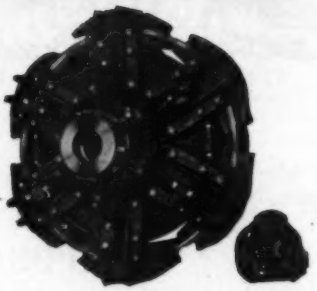
"NORTHERN" means SATISFACTION

ELECTRIC HOISTS *Catalogs Free*

NORTHERN CRANES

NORTHERN ENGINEERING WORKS. DETROIT, MICH.

THE HILL CLUTCH CO



Hill Friction Clutches
(SMITH TYPE)

¶The most powerful clutch built. Vise-like jaws in pairs grip the ring, and are actuated by a powerful toggle mechanism. No springs are used. Clutch is self-centering, and in a friction clutch cut-off coupling no alignment bushing is required, so that when clutch is disengaged there are no revolving parts in contact—therefore, no wear.

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The American Pulp and Paper Mill Superintendents' Association News

Michigan Section Organized

The Michigan and Northern Indiana Pulp and Paper Mill Superintendents assembled at the Park American Hotel, Kalamazoo, Mich., on July 10-11 and formed the Michigan branch of the association, assisted by William T. Fogarty, the chairman of the executive committee of the national association, and Peter J. Massey, the secretary-treasurer.

An election of officers was held on July 11, at which time the following officers were elected: Mr. Ed Coughlin, chairman; Mr. Luther Parker, vice-chairman; Mr. Pountain, secretary-treasurer.

The next regular meeting will be held on July 22 at the Park American Hotel, Kalamazoo, Mich., at which time the divisional organization will be perfected, the various committees appointed and action taken in regard to the invitation extended by Mr. Fogarty in behalf of the National Association to the meeting at Green Bay, Wis., on July 31 and August 1.

The Green Bay Meeting

On July 31 and August 1, there will be a meeting of the American Paper and Pulp Mill Superintendents' Association at Green Bay, Wisconsin.

The meeting will be divided into morning and afternoon sessions. The morning sessions, from 9:00 A. M. to 12:00 M., will be devoted to business meetings, committee meetings, etc., for the perfection of the organization. The afternoon sessions will be held as open meetings. At these sessions addresses of vital interest to the paper industry will be delivered by the best authorities on the various subjects, who will welcome all questions and discussions on their various topics.

In regard to entertainment, the committee assures us that there are many surprises in store for all those attending this meeting and would like to have their part of the program left out of this letter in order that they may make their surprises good. All that we can assure you is that every one attending will positively have a good time.

The following is the program as now prepared:

July 31, 2 to 6 P. M.

The Dyes Used in Paper Making, by Dr. Otto Kress. In charge of Paper Section of the Forest Products Laboratory.

Are You Oiling the Safety Movement, by Al Kroes, Safety First Service Engineer.

Lubrication of Pulp and Paper Mill Machinery, by A. S. Pritchard, Paper Mill Lubrication Engineer.

Paper Mill Illumination, by H. T. Spaulding, Paper Mill Illumination Engineer.

August 1, 2 to 6 P. M.

Industrial Relations and Vocational Education, by George P. Hambrecht, Chairman Industrial Commission of Wisconsin.

Water Used in Paper Making, by J. J. Sefelfesser, Water Softening Engineer.

Paper Mill Construction, by M. C. J. Billingham, Paper Mill Construction Engineer.

Testing of Paper Making Felts and Rubber Rolls, by F. C. Liske, Testing Material Engineer.

And a representative from the Cost Association of the Paper Industry will give an address on "Cost Finding in Paper Mills."

All of these addresses are being prepared from the standpoint of the paper mill superintendent and will be open to all who may be interested in the various topics, whether they are superintendents, managers or other paper mill executives. All are cordially invited to be present, as the afternoon meetings will be open meetings.

You cannot possibly afford to miss this meeting, as the subjects to be discussed are of vital importance to every one in the industry. Make your arrangements and reservations immediately, to insure your attending this meeting, and have as many of your friends come along as possible.

(*Continued from page* 293)

use. Three other sizes are built, 18x18-in., 22x26-in. and 24x24-in.

The frame of the American Ashpit Door is of cast iron of ample strength for all conditions, with the hinge and locking lugs cast on. The frame is of angle design and sets well back into the setting. It is easily fastened into the pit wall by four bolts, one in each corner. The bearing surface is carefully machined and the hinge lugs are of ample strength to meet the hard usage to which these doors are subjected in regular service.

The door itself is of heavy iron and is provided with a heavy ventilated cast iron liner to prevent contact with the hot ashes and consequent warping. The bearing surface of the door is also carefully machined to make an air-tight joint with the frame.

The hinges are of the floating type and two are provided. The hinge bars are pivoted to the frame and carry the door at the center where it is pivoted to the bars. This gives a perfectly distributed pressure over the door and keeps a tight joint at all points with no possibility of a clinker in the corner of the frame opening, breaking or bending the door by a wedge action. It also allows the door to be swung entirely out of the operator's way.

This door is easily, quickly and tightly locked by means of the wing nuts at the end of the hinge bars. In the case of the 24x36-in. door, two locks are used. The other sizes have but one locking lug.

The door is manufactured by the American Steam Conveyor Corporation, Chicago and New York, which will be glad to furnish further particulars on request.

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Wood Pulp

Shipments of chemical wood pulp from the Scandinavian countries are arriving at New York with considerable regularity, and representative members of the importing trade say that from now on the volume of pulp received should show a steady increase, it being stated that comparatively large amounts are en route or bought for forward shipment. Prices on the other side have eased off a little, at any rate enough to induce consumers in the United States to place orders with less reluctance, and local importers say they are effecting sales involving substantial tonnages of pulp. Bleached sulphite is quotable at between 7.25 and 8.00 cents a pound ex dock, while unbleached sulphite of No. 1 grade is priced at 4.50 to 4.75 cents, and easy bleaching at 5.00 to 5.25 cents. Scandinavian kraft is being offered at 4.00 to 4.25 cents. Receipts for the past month and current quotations are as follows:

Bleached sulphite	7.25-8.00
Unbleached sulphite, No. 1	4.50-4.75
Easy bleaching	5.00-5.25
Mitscherlich unbleached	5.00-5.50
Kraft	4.00-4.25

American Woodpulp Corp., 2,500 bls. sulphate and 625 bls. sulphate from Gothenburg.

Scandinavian-American Trading Co., 820 bls. soda from Gothenburg.

Page, Newell & Co., 1,200 bls. sulphate from Gothenburg.

Tidewater Paper Mills, 28,490 bls. ground wood from Liverpool, N. S.

Paper Stock

Papermaking rags are coming in from foreign sources in steadily increasing quantity. The bulk of the shipments are made up of dark cottons and other roofing mill rags, but occasional lots of high-grade material are being received, and importers say that there is every reason to expect comparatively heavy arrivals during the next several months owing to the fact that prices in European countries and those here have become equalized to a sufficient degree to permit the importation of rags into the United States at a good profit. Old rope continues to arrive in sizable parcels, while receipts of old bagging show an increase. Arrivals at this port during the past month follow:

Rags

Certain-Teed Products Corp., 125 bls. from Glasgow.

Kidder, Peabody & Co., 497 bls. from Hull.

E. J. Keller & Co., 42 bls. from Leith.

Castle, Gottheil & Overton, 143 bls. from London.

Edwin Butterworth & Co., 751 bls. from Havre.

Daniel M. Hicks, Inc., 160 bls. from London.

Old Rope

Edwin Butterworth & Co., 131 coils from Liverpool.

Castle, Gottheil & Overton, 83 coils from London.

Bemis Bro. Bag Co., 53 coils from Leith, and 226 coils from Bristol.

M. A. De Leon & Co., 9 bls. from Colon.

Old Colony Trust Co., 336 coils from Bristol.

International Purchasing Co., 106 coils from Bristol.

Brown Bros. & Co., 125 coils from Hull.

Old Bagging

Kidder, Peabody & Co., 398 bls. from Hull.

Edwin Butterworth & Co., 225 bls. from Liverpool.

Mechanics & Metals National Bank, 104 bls. from Glasgow.

E. J. Keller & Co., 310 bls. from Rotterdam.

Miscellaneous Paper Stock

Castle, Gottheil & Overton, 910 bls. from Rotterdam.

Mechanics & Metals National Bank, 123 bls. from Rotterdam, and 174 bls. from Glasgow.

Salomon Bros. & Co., 219 bls. from Rotterdam, and 38 bls. from Hull.

Guaranty Trust Co., 170 bls. from Rotterdam.

Edwin Butterworth & Co., 40 bls. from Rotterdam.

Wilkinson Bros. & Co., 56 bls. from Hull, and 32 bls. from Liverpool.

Paper

Importations of paper have dropped off to a marked extent during the past month, while on the other hand receipts of foreign papermaking material at the port of New York have materially increased. Only three shipments, aggregating about 126 cases, of cigarette papers have arrived during the month, and imports of hanging, filter and other kinds of paper have undergone a corresponding decrease. Arrivals since June 12 are as follows:

Cigarette Paper

P. J. Schweitzer, 95 cs.

Ban Bers Trust Co., 28 cs.

Southern Pacific Co., 3 cs.

Hanging Paper

Davies, Turner & Co., 1 cse.

W. H. S. Lloyd & Co., 29 bls.

Holyoke Machine Co. HOLYOKE MASS.

Makers of Improved Machinery for Wood Pulp & Paper Mills

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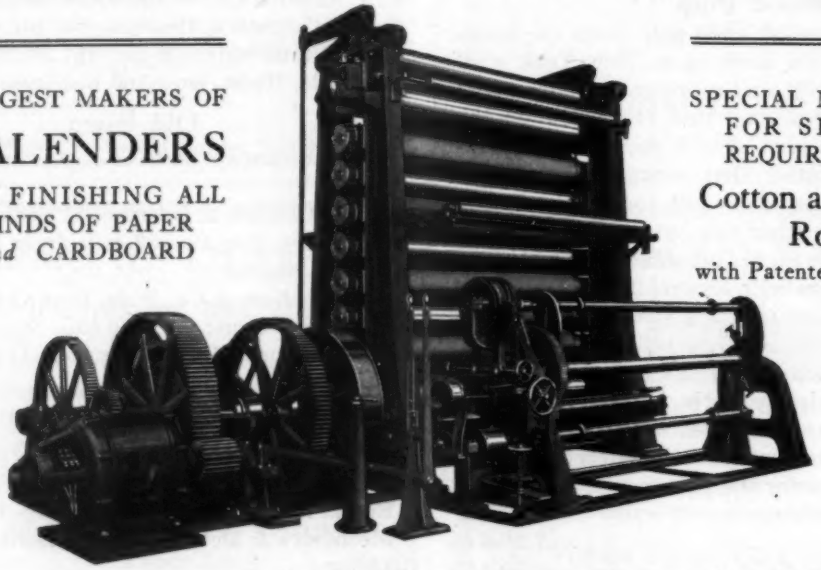

SPECIAL MACHINES FOR SPECIAL REQUIREMENTS
Cotton and Paper Rolls
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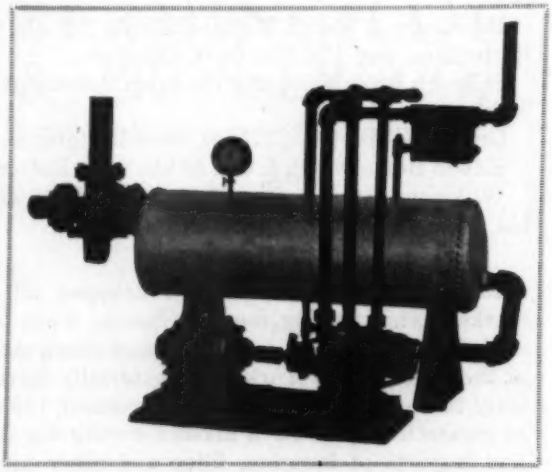

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Leigh & Butler, 10 cs.
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C. A. Johnson & Co., 15 bls.
Bernard, Judae & Co., 20 cs.
Park & Tilford, 6 cs.
E. Dietzgin & Co., 3 cs.
O. Weeks & Co., 2 cs.
United States Trust Co., 2 cs.
G. H. Smith, 27 cs.
H. D. Catty & Co., 11 cs.
Maltus & Ware, 8 cs.
Gillespie Bros. & Co., 3 bls.
G. D. Kuper & Bros., 472 rls.

Foreign Trade Opportunities

An importer in Belgium wishes to purchase and secure an agency and consignment of paper pulp and paper. Quotations should be given c. i. f. Antwerp. Payment against credit guaranteed by bank. Correspondence should be in French. References. For further data those interested should communicate with the Bureau of Foreign and Domestic Commerce, Washington, D. C., referring to Inquiry No. 29,861.

A commercial agent from Norway, who is in the United States, desires to secure agencies for the sale in his country of woolen felts for the paper industry. References. For further data those interested should communicate with the Bureau of Foreign and Domestic Commerce, Washington, D. C., referring to Inquiry No. 29,872.

The purchase or agency is desired by a man in Italy of stationery, post cards, writing paper and calendars. Quotations should be given c. i. f. Genoa. Correspondence should be in Italian. References. For further data those interested should communicate with the Bureau of Foreign and Domestic Commerce, Washington, D. C., referring to Inquiry No. 29,866.

The purchase or agency for the sale of printing, typewriter, waxed and emery paper and writing paper in boxes is desired by a man in Italy. Correspondence may be in English. References. For further data those interested should communicate with the Bureau of Foreign and Domestic Commerce, Washington, D. C., referring to Inquiry No. 29,670.

A manufacturer in Argentina wishes to be placed in touch with firms for the purchase of blue print paper. For further data those interested should communicate with the Bureau of Foreign and Domestic Commerce, Washington, D. C., referring to Inquiry No. 29,754.

A company in India requests quotations for up-to-date machinery for a paper making plant to manufacture paper from bamboo. Capacity of the mill should be 1,000 to 2,000 tons per year. Full estimates on the machinery, as to the horsepower required, etc., is desired. Samples of the raw materials to be utilized will be furnished if requested. References. For further data those interested should communicate with the Bureau of Foreign and Domestic Commerce, Washington, D. C., referring to Inquiry No. 29,187.

Typewriter bond paper, book cover paper, vegetable parchment, glassine paper, ledger and wax paper are required by a wholesale and retail firm in Spain. Quotations should be given f. o. b. American port. Terms, cash against documents at port of shipment. Correspondence should be in Spanish. References. For further data those interested should communicate with the Bureau of Foreign and Domestic Commerce, Washington, D. C., referring to Inquiry No. 29,774.

Boiler Room Hints

In cooling down a boiler for cleaning it should be done slowly so there will be no cracking of the brickwork or strains set up in the boiler from unequal expansion. The boiler should be left filled with water until completely cool, thus avoiding baking of the mud and scale.

In banking fires, in which coal is hand fired, the fire should first be cleaned, and the fire should then be pushed to the back of the furnace and both fire and grates covered with green coal, and drafts closed and damper left as nearly closed as can be without making the furnace smoke.

When boilers are idle brickwork, grates, baffles, damper, etc., should be cleaned and inspected; repairs being made wherever needed.

All fittings should be inspected and repaired or replaced where needed, thus putting them in dependable condition for the next run.

Reinforcement of Fibre Boxes

In the testing of fibre-board boxes, it was found that failure in these containers usually occurred at the horizontal scores or edges. To strengthen the scores, glued paper or cloth tape was applied to the outside of the box at these points. The tape was dipped in water for from one to ten seconds before applying it to the box, thus insuring greater adhesion. Proper taping added about 25 per cent to the strength or carrying capacity of the box.

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WE wish to emphasize the word "automatic." This with us means that the steam follows changes that come to the sheet from free to hard drying stock or any ordinary changes in weights. A control that does not do this in itself is not automatic. This makes a better sheet of paper. We guarantee to hold the moisture at any point you wish with ½ of 1% change. Furnished on 60 days' approval.

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Large, Modern Designed ENGINES

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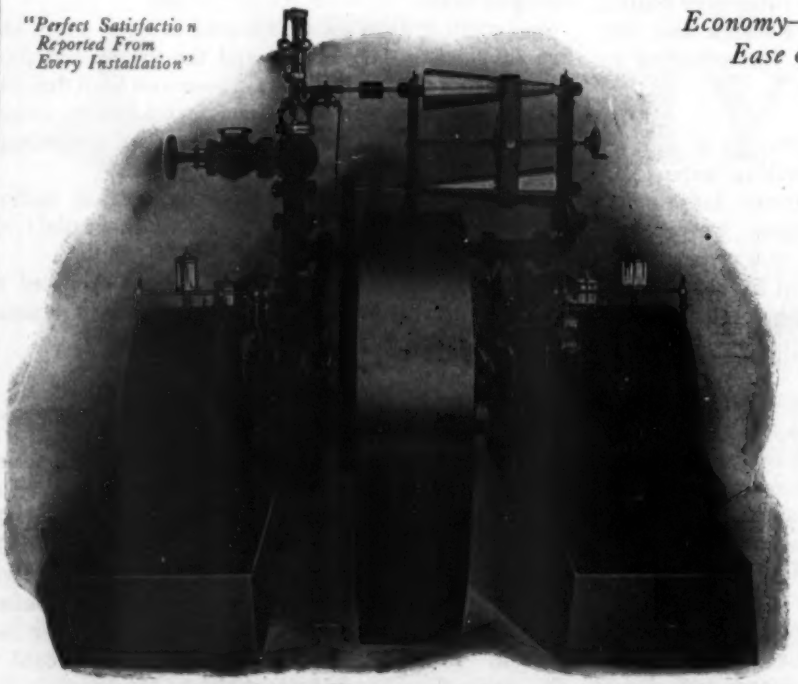

Economy—Continuity of Performance—
Ease of Care and Adjustment—
Infrequency of Repairs—

These, the important requirements of an engine, are met by "ERIE" double variable speed engines.

To the Paper Mill Trade

Repeat orders have without exception been arranged with every user of these engines who has had subsequent requirements, and we will be glad to furnish definite references and full information as to price, delivery and equipment to meet your requirements, and will appreciate an opportunity to furnish these details by mail and the privilege of personal interviews being arranged.

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ANGLE VALES
The Crane Company, Chicago, Ill.

ARCHITECTS
James L. Carey, 208 N. Laramie St., Chicago, Ill.

ASSORTING TABLES
Moore and White Co., Philadelphia, Pa.

ASH CONVEYOR SYSTEMS
American Steam Conveyor Corp., Chicago, Ill.

BARKERS
Holyoke Machine Co., Holyoke, Mass.
Valley Iron Works Co., Appleton, Wis.

BARKING DRUMS
H. O. Numan, Green Bay, Wis.

BEATER BARS
John W. Bolton & Sons, Inc., Lawrence, Mass.
R. J. Dowd Knife Works, Beloit, Wis.

BEATER BED PLATES
John W. Bolton & Sons, Inc., Lawrence, Mass.

BEATER ROLL FILLING
R. J. Dowd Knife Works, Beloit, Wis.

BEATING, WASHING AND BLEACHING ENGINES
Holyoke Machine Co., Holyoke, Mass.
Valley Iron Works Co., Appleton, Wis.

BEATERS (Continuous)
Claflin Engineering Co., Lancaster, Ohio.

BELTING (Rubber)
United States Rubber Co., New York and Chicago

BELT DRIVES
The Hill Clutch Co., Cleveland, Ohio.

BLEACHING (Propellers)
Moore and White Co., Philadelphia, Pa.

BLOWERS
Buffalo Steam Pump Co., Buffalo, N. Y.

BOARDS (Straw)
The C. L. La Boiteaux Co., Cincinnati, O.

BRASS WIRE CLOTH
Appleton Wire Works, Appleton, Wis.
Lindsay Wire Weaving Co., Cleveland, Ohio.
Wisconsin Wire Works, Appleton, Wis.

BRONZE JACKETS
Sandusky Foundry & Machine Co., Sandusky, Ohio.

BUNDLING SYSTEMS
Signode System, Lake St., Chicago

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Holyoke Machine Co., Holyoke, Mass.

CALENDER DOCTORS
Ticonderoga Machine Works, Ticonderoga, N. Y.

CALENDER ROLLS
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B. F. Perkins and Son, Inc., Holyoke, Mass.

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American Steam Pump Co., Battle Creek, Mich.
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Wisconsin Wire Works, Appleton, Wis.

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Binney & Smith, 81-83 Fulton St., N. Y. City.

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Lindsay Wire Weaving Co., Cleveland, Ohio.
Wisconsin Wire Works, Appleton, Wis.

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Wm. Graver Tank Works, East Chicago, Ind.
Wm. B. Scaife and Sons Co., Oakmont, Pa.

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Holyoke Machine Co., Holyoke, Mass.

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John W. Bolton & Sons, Inc., Lawrence, Mass.
Simonds Manufacturing Co., Fitchburg, Mass.

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PAPER CUTTERS
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Munising Paper Co., Munising, Mich.
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Ticonderoga Pulp & Paper Co., 200 Fifth Ave., New York City.
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Wausau Sulphate Fibre Co., Mosinee, Wis.
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New York Overseas Co., Inc., 17 Battery Place, New York City.
Francis Hughes Co., 21st St. and Loomis Ave., Chicago.
Mendelson Bros. Paper Stock Co., 910 Michigan Ave., Chicago.
Main Paper Stock Co., 25-31 Peck Slip, New York City.

PARCHMENT MANUFACTURERS
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Sutherland Paper Co., Kalamazoo, Mich.

PAPER TESTERS
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New York Overseas Co., Inc., 17 Battery Place, New York City.
Scandinavian-American Trading Co., 50 East 42d St., New York City.

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The Green Bay Foundry and Machine Co., Green Bay, Wis.

SUCTION ROLLS
Sandusky Foundry and Machine Co., Sandusky, Ohio.

SULPHUR BURNERS
Valley Iron Works Co., Appleton, Wis.

TIERING MACHINES
Economy Engineering Co., Chicago, Ill.

TURBINES (Water)
James Leffel and Co., Springfield, Ohio.

VACUUM SYSTEMS
Open Coil Heater and Purifier Co., Indianapolis, Ind.

VALVES
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VENTILATING SYSTEMS
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